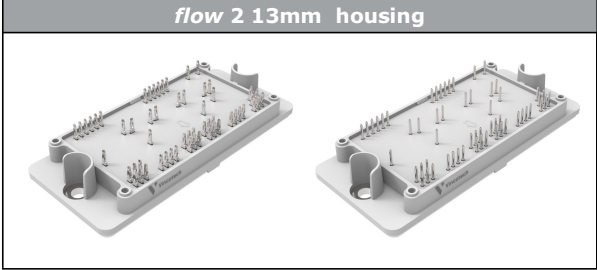
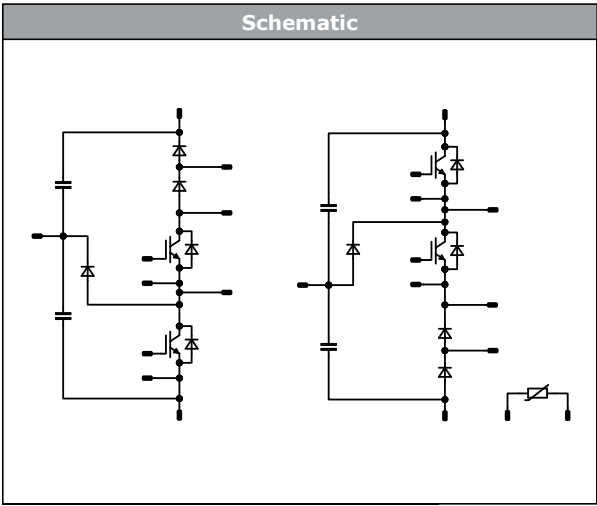




<i>flowNPC 2</i>	1200 V / 300 A
<div style="background-color: #eee; padding: 5px; margin-bottom: 10px;"><b>Features</b></div> <ul style="list-style-type: none"> <li>Enhanced efficiency</li> <li>Enables high switching frequencies</li> <li>Low inductive package</li> <li>Allows four quadrant operation</li> </ul> <div style="background-color: #eee; padding: 5px; margin-bottom: 10px;"><b>Target applications</b></div> <ul style="list-style-type: none"> <li>Industrial Drives</li> <li>Solar Inverters</li> <li>UPS</li> </ul> <div style="background-color: #eee; padding: 5px;"><b>Types</b></div> <ul style="list-style-type: none"> <li>30-FT07NIB300S503-LH36F58</li> <li>30-PT07NIB300S503-LH36F58Y</li> </ul>	<div style="background-color: #eee; padding: 5px; margin-bottom: 10px;"><b>flow 2 13mm housing</b></div>  <div style="background-color: #eee; padding: 5px; margin-bottom: 10px;"><b>Schematic</b></div> 

## Maximum Ratings

$T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
<b>Buck Switch</b>				
Collector-emitter voltage	$V_{CES}$		650	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	260	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	900	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	389	W
Gate-emitter voltage	$V_{GES}$		±20	V
Maximum junction temperature	$T_{jmax}$		175	°C



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## Maximum Ratings

$T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
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### Buck Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	215	A
Repetitive peak forward current	$I_{FRM}$		600	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	273	W
Maximum junction temperature	$T_{jmax}$		175	°C

### Buck Sw. Protection Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	30	A
Repetitive peak forward current	$I_{FRM}$		60	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	59	W
Maximum junction temperature	$T_{jmax}$		175	°C

### Boost Switch

Collector-emitter voltage	$V_{CES}$		650	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	255	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	675	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	291	W
Gate-emitter voltage	$V_{GES}$		±20	V
Maximum junction temperature	$T_{jmax}$		175	°C

### Boost Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	215	A
Repetitive peak forward current	$I_{FRM}$		600	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	273	W
Maximum junction temperature	$T_{jmax}$		175	°C



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## Maximum Ratings

$T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
<b>Boost Sw.Inv.Diode</b>				
Peak repetitive reverse voltage	$V_{\text{RRM}}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{j\text{max}}$ $T_s = 80\text{ °C}$	215	A
Repetitive peak forward current	$I_{\text{FRM}}$		600	A
Total power dissipation	$P_{\text{tot}}$	$T_j = T_{j\text{max}}$ $T_s = 80\text{ °C}$	273	W
Maximum junction temperature	$T_{j\text{max}}$		175	°C

### Boost Sw. Protection Diode

Peak repetitive reverse voltage	$V_{\text{RRM}}$		650	V
Continuous (direct) forward current	$I_F$	$T_j = T_{j\text{max}}$ $T_s = 80\text{ °C}$	30	A
Repetitive peak forward current	$I_{\text{FRM}}$		60	A
Total power dissipation	$P_{\text{tot}}$	$T_j = T_{j\text{max}}$ $T_s = 80\text{ °C}$	59	W
Maximum junction temperature	$T_{j\text{max}}$		175	°C

### Capacitor (DC)

Maximum DC voltage	$V_{\text{MAX}}$		630	V
Operation Temperature	$T_{\text{op}}$		-55...+150	°C

## Module Properties

### Thermal Properties

Storage temperature	$T_{\text{stg}}$		-40...+125	°C
Operation temperature under switching condition	$T_{\text{jop}}$		-40...( $T_{j\text{max}} - 25$ )	°C

### Isolation Properties

Isolation voltage	$V_{\text{isol}}$	DC Test Voltage* $t_p = 2\text{ s}$	4000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			min. 12,7	mm
Comparative Tracking Index	CTI		> 200	

\*100 % tested in production



## Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	

### Buck Switch

#### Static

Parameter	Symbol	$V_{GE} = V_{CE}$	$V_{GS}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				0,003	25	3,2	4	4,8	V
Collector-emitter saturation voltage	$V_{CESat}$		15		300	25 125 150		1,43 1,52 1,55	1,75	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			200	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			400	nA
Internal gate resistance	$r_g$							none		Ω
Input capacitance	$C_{ies}$							18000		pF
Output capacitance	$C_{oes}$	$f = 1$ Mhz	0	25		25		520		
Reverse transfer capacitance	$C_{res}$							68		
Gate charge	$Q_g$		15	520	300	25		656		nC

#### Thermal

Parameter	Symbol	$\lambda_{paste} = 3,4$ W/mK (PSX)	$V_{GS}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$							0,24		K/W

#### Dynamic

Parameter	Symbol	$R_{gon} = 2$ Ω $R_{goff} = 2$ Ω	$V_{GS}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$\pm 15$	350	252	25 125 150	25		117 116 116		ns
Rise time	$t_r$						25 125 150	16 18 17		
Turn-off delay time	$t_{d(off)}$						25 125 150	130 148 153		
Fall time	$t_f$						25 125 150	14 21 24		
Turn-on energy (per pulse)	$E_{on}$						$Q_{tFWD} = 7,3$ μC $Q_{tFWD} = 14,9$ μC $Q_{tFWD} = 17,6$ μC	25 125 150	2,72 3,17 5,61	
Turn-off energy (per pulse)	$E_{off}$							25 125 150	1,88 3,47 4,01	



Vincotech

**30-FT07NIB300S503-LH36F58**  
**30-PT07NIB300S503-LH36F58Y**  
 datasheet

### Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max		

#### Buck Diode

##### Static

Parameter	Symbol	$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			300	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	$I_R$		650		25			15,2	μA

##### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,35	K/W

##### Dynamic

Parameter	Symbol	Conditions	Value	Unit
Peak recovery current	$I_{RRM}$		25 125 150	211 298 328
Reverse recovery time	$t_{rr}$		25 125 150	56 77 86
Recovered charge	$Q_r$	$di/dt = 12198$ A/μs $di/dt = 11950$ A/μs $di/dt = 11550$ A/μs	±15 350	252
Reverse recovered energy	$E_{rec}$		25 125 150	7,34 14,87 17,59
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$		25 125 150	1,52 3,49 3,95
			25 125 150	6515 6781 5496

#### Buck Sw. Protection Diode

##### Static

Parameter	Symbol	$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			30	25 150		1,64 1,56	1,87	V
Reverse leakage current	$I_R$		650		25			0,36	μA

##### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	1,61	K/W



## Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	

### Boost Switch

#### Static

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$				0,003	25	4,2	5	5,8	V
Collector-emitter saturation voltage	$V_{CESat}$		15			225	25 125 150		1,10 1,08 1,09	1,45	V
Collector-emitter cut-off current	$I_{CES}$		0	650			25			120	μA
Gate-emitter leakage current	$I_{GES}$		20	0			25			300	nA
Internal gate resistance	$r_g$								none		Ω
Input capacitance	$C_{ies}$								34875		pF
Output capacitance	$C_{oes}$	$f = 1$ Mhz	0	25		25			450		
Reverse transfer capacitance	$C_{res}$								90		
Gate charge	$Q_g$		15	520	225		25		1308		nC

#### Thermal

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							0,33		K/W

#### Dynamic

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$						25 125 150		187 188 188		ns
Rise time	$t_r$	$R_{gon} = 2$ Ω $R_{goff} = 2$ Ω					25 125 150		17 18 18		
Turn-off delay time	$t_{d(off)}$						25 125 150		225 253 261		
Fall time	$t_f$						25 125 150		89 210 240		
Turn-on energy (per pulse)	$E_{on}$	$Q_{tFWD} = 8,1$ μC $Q_{tFWD} = 16,2$ μC $Q_{tFWD} = 18,9$ μC					25 125 150		1,986 2,250 2,337		mWs
Turn-off energy (per pulse)	$E_{off}$						25 125 150		11,100 16,009 16,789		



## Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max		

### Boost Diode

#### Static

Parameter	Symbol	$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			300	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	$I_R$		650		25			15,2	μA

#### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,35	K/W

#### Dynamic

Parameter	Symbol	Conditions	Value	Unit			
Peak recovery current	$I_{RRM}$		25 125 150	170 254 273			
Reverse recovery time	$t_{rr}$		25 125 150	70 99 109			
Recovered charge	$Q_r$	$di/dt = 12261$ A/μs $di/dt = 12850$ A/μs $di/dt = 12763$ A/μs	±15 350	252	25 125 150	8,076 16,202 18,915	μC
Reverse recovered energy	$E_{rec}$				25 125 150	1,923 3,759 4,384	mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$				25 125 150	2039 2120 1892	A/μs

### Boost Sw.Inv.Diode

#### Static

Parameter	Symbol	$V_{GE}$ [V]	$V_{CE}$ [V]	$I_C$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			300	25 125 150		1,53 1,49 1,47	1,92	V
Reverse leakage current	$I_R$		650		25			15,2	μA

#### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,35	K/W



### Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	

#### Boost Sw. Protection Diode

##### Static

Forward voltage	$V_F$				30	25 150		1,64 1,56	1,87	V
Reverse leakage current	$I_R$			650		25			0,36	μA

##### Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						1,61		K/W
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#### Capacitor (DC)

Capacitance	C							33		nF
Tolerance							-5		+5	%

#### Thermistor

Rated resistance	R					25		22		kΩ
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$				25		3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$				25		4000		K
Vincotech NTC Reference									I	



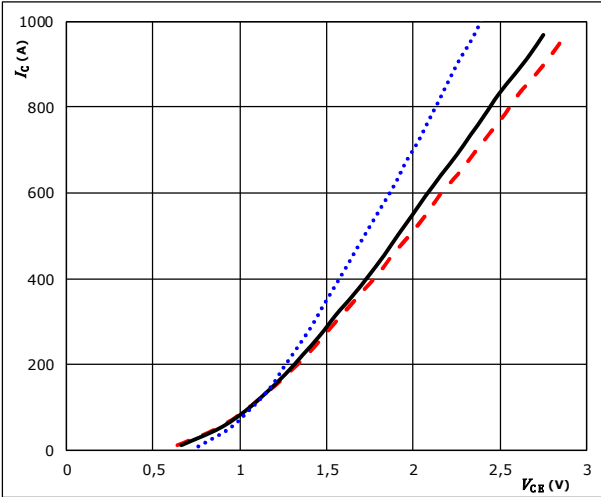


## Buck Switch Characteristics

**figure 1.** IGBT

Typical output characteristics

$I_C = f(V_{CE})$

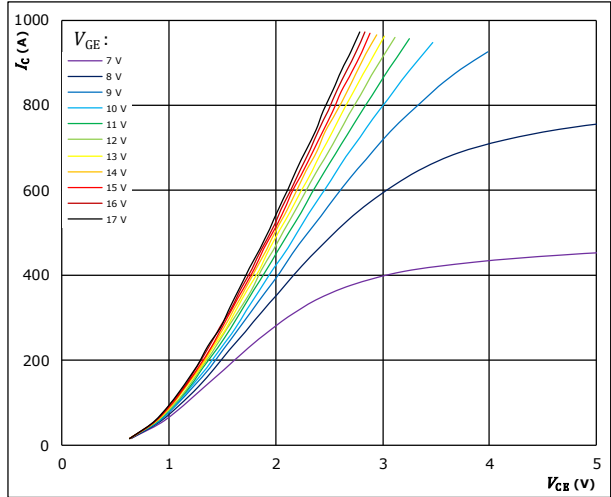


$t_p = 250 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{GE} = 15 \text{ V}$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 2.** IGBT

Typical output characteristics

$I_C = f(V_{CE})$

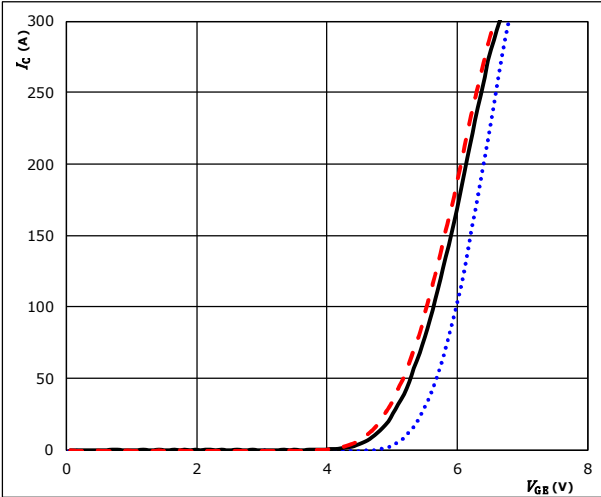


$t_p = 250 \mu s$   
 $T_j = 150 \text{ }^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3.** IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

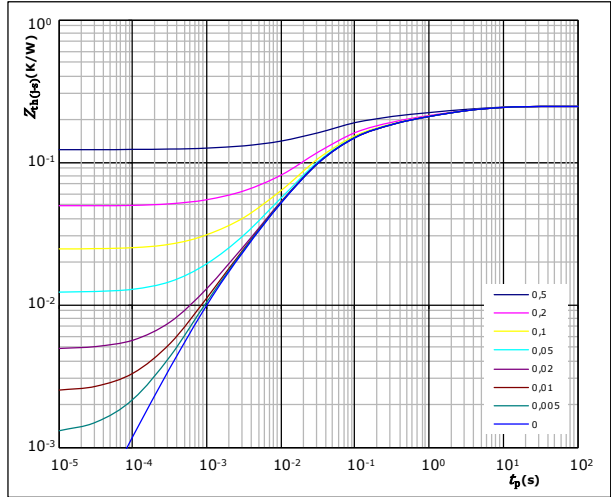


$t_p = 100 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{CE} = 10 \text{ V}$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 4.** IGBT

Transient thermal impedance as function of pulse duration

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$   
 $R_{th(j-s)} = 0,24 \text{ K/W}$

IGBT thermal model values

R (K/W)	$\tau$ (s)
3,19E-02	4,04E+00
3,56E-02	8,39E-01
5,47E-02	1,56E-01
9,39E-02	3,22E-02
2,10E-02	7,54E-03
7,41E-03	1,20E-03

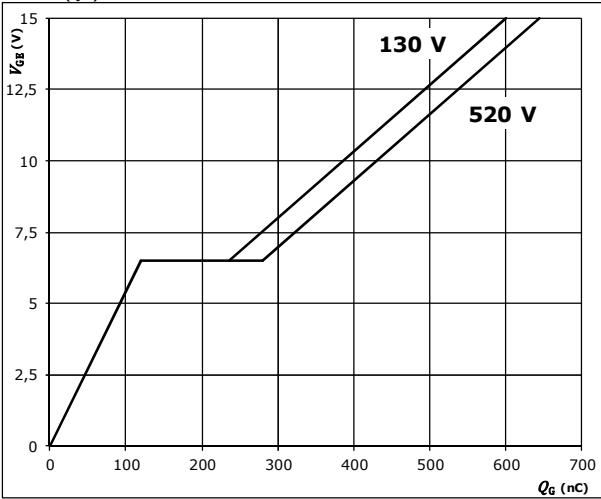


### Buck Switch Characteristics

**figure 5.** IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

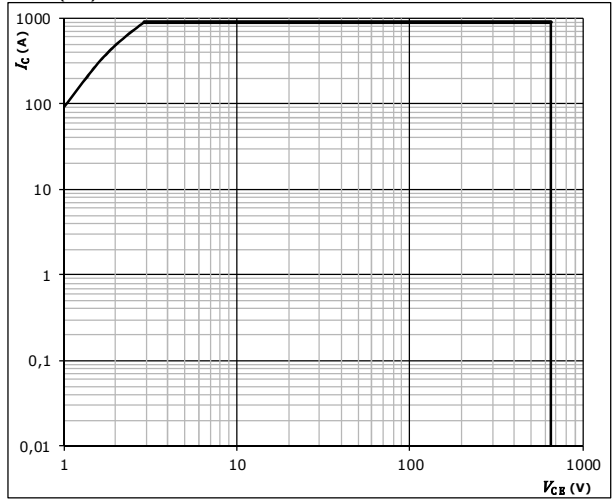


$I_C = 300$  A

**figure 6.** IGBT

Safe operating area

$I_C = f(V_{CE})$



$D =$  single pulse  
 $T_s = 80$  °C  
 $V_{GE} = \pm 15$  V  
 $T_j = T_{jmax}$

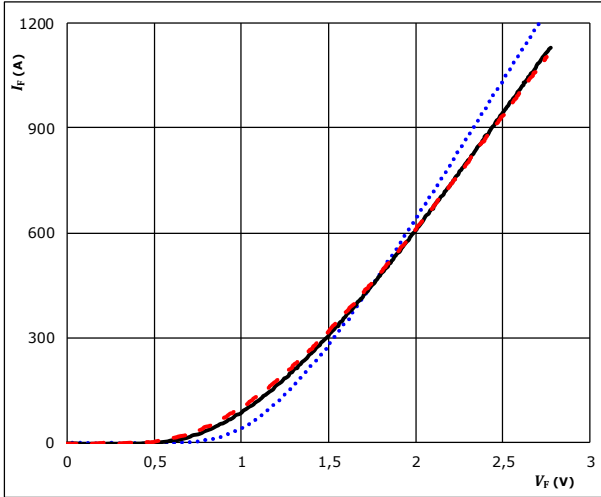


## Buck Diode Characteristics

**figure 1.** **FWD**

Typical forward characteristics

$$I_F = f(V_F)$$

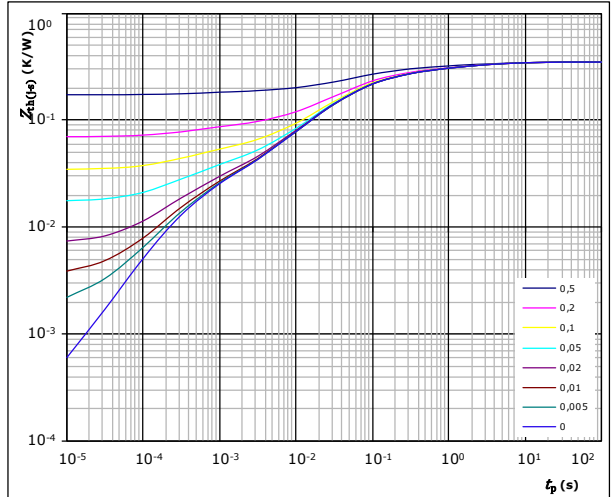


$t_p =$  250  $\mu$ s  
 $T_j$ : 25 °C .....  
 125 °C ———  
 150 °C - - - -

**figure 2.** **FWD**

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D =$   $t_p / T$   
 $R_{th(j-s)} =$  0,35 K/W

FWD thermal model values

$R$ (K/W)	$\tau$ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

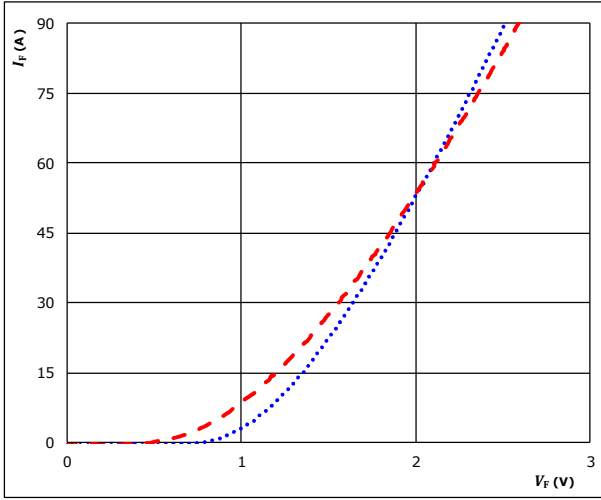


## Buck Sw. Protection Diode Characteristics

**figure 1.** FWD

Typical forward characteristics

$$I_F = f(V_F)$$

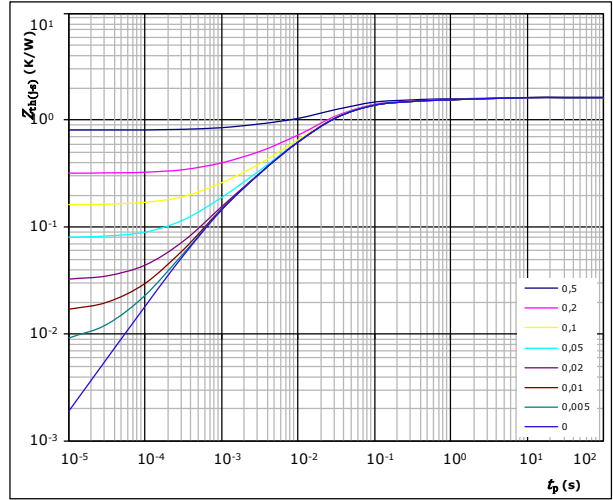


$t_p = 250 \mu s$   
 $T_j: 25 \text{ }^\circ\text{C}$  (dotted blue line)  
 $150 \text{ }^\circ\text{C}$  (dashed red line)

**figure 2.** FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$   
 $R_{th(j-s)} = 1,61 \text{ K/W}$   
 FWD thermal model values

$R$ (K/W)	$\tau$ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

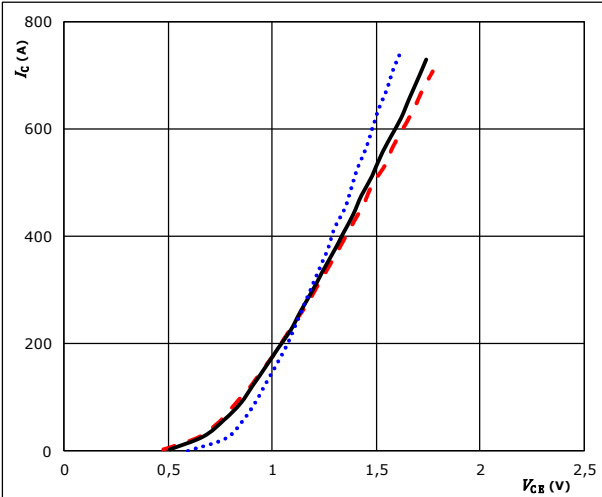


### Boost Switch Characteristics

**figure 1. IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

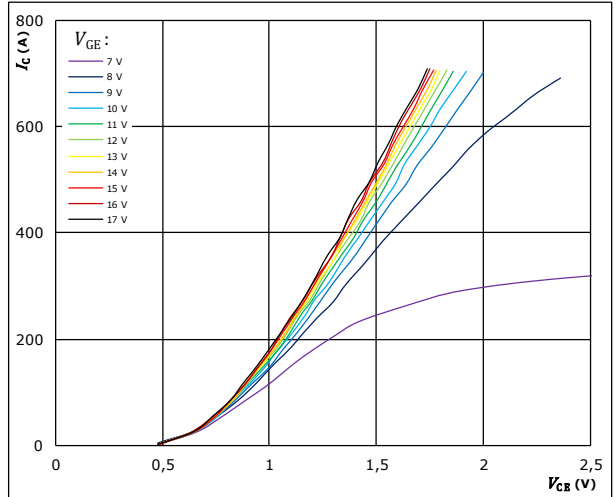


$t_p = 250 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{GE} = 15 V$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 2. IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

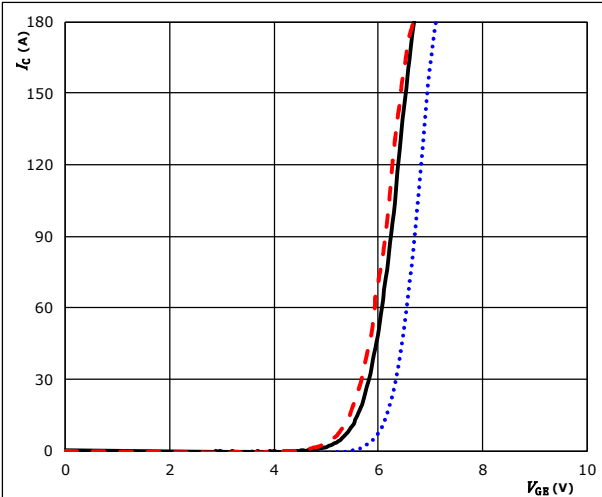


$t_p = 250 \mu s$   
 $T_j = 150 \text{ }^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3. IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

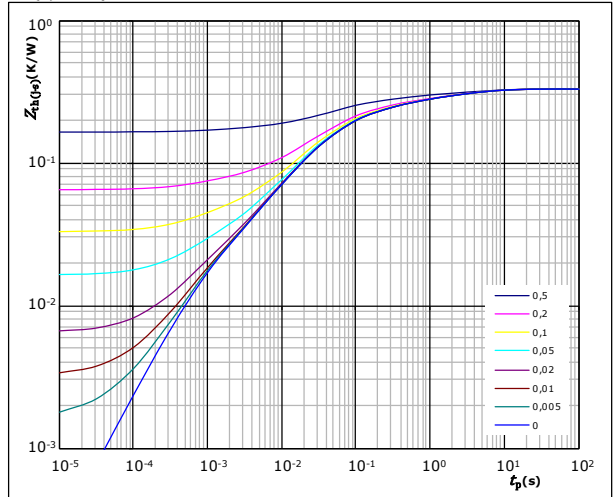


$t_p = 100 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{CE} = 10 V$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 4. IGBT**

Transient thermal impedance as function of pulse duration

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$   
 $R_{th(j-s)} = 0,33 \text{ K/W}$   
 IGBT thermal model values

$R$ (K/W)	$\tau$ (s)
3,76E-02	5,13E+00
4,38E-02	1,11E+00
7,93E-02	1,80E-01
1,25E-01	3,35E-02
2,76E-02	6,84E-03
1,27E-02	7,61E-04

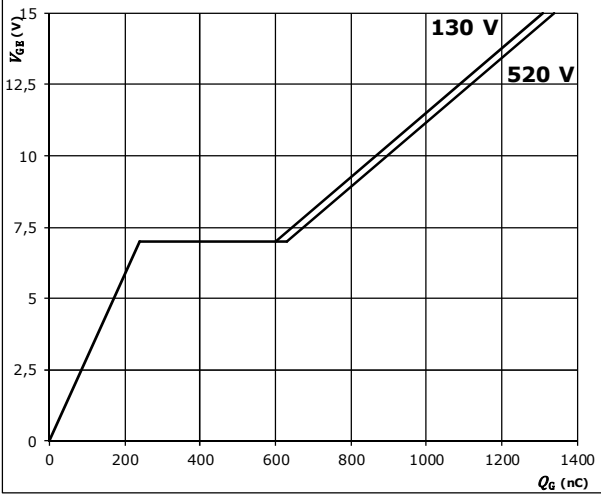


### Boost Switch Characteristics

**figure 5. IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

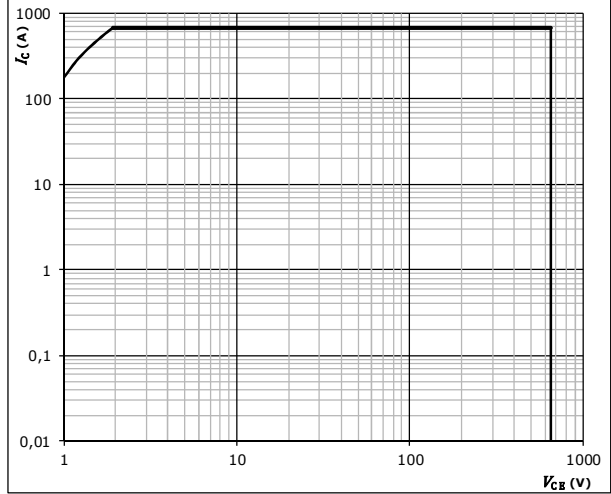


$I_C = 225$  A

**figure 6. IGBT**

Safe operating area

$I_C = f(V_{CE})$



$D =$  single pulse  
 $T_s = 80$  °C  
 $V_{GE} = \pm 15$  V  
 $T_j = T_{jmax}$

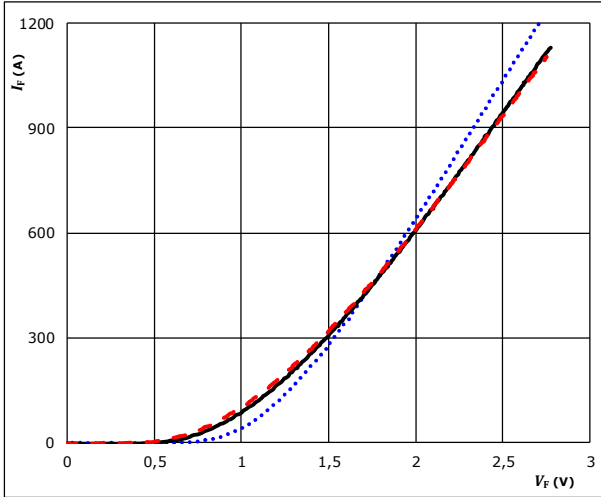


## Boost Diode Characteristics

**figure 1.** FWD

Typical forward characteristics

$$I_F = f(V_F)$$

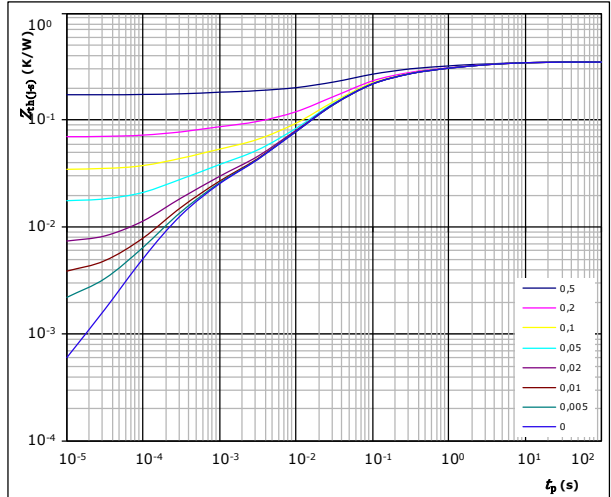


$t_p =$  250  $\mu$ s  
 $T_j$ : 25 °C .....  
 125 °C ———  
 150 °C - - - -

**figure 2.** FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D =$   $t_p / T$   
 $R_{th(j-s)} =$  0,35 K/W

FWD thermal model values

$R$ (K/W)	$\tau$ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04

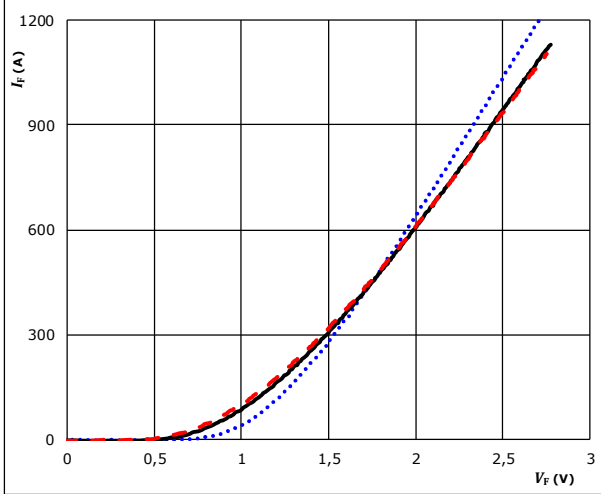


### Boost Sw.Inv.Diode Characteristics

**figure 1.** **FWD**

Typical forward characteristics

$I_F = f(V_F)$

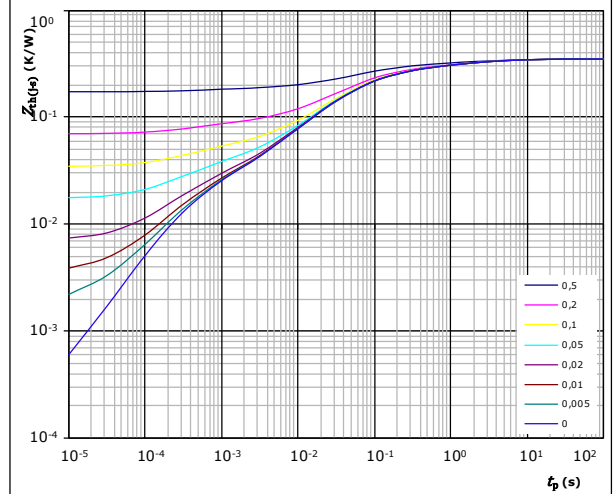


$t_p = 250 \mu s$   
 $T_j$ : 25 °C .....  
 125 °C ———  
 150 °C - - - -

**figure 2.** **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



$D = t_p / T$   
 $R_{th(j-s)} = 0,35 \text{ K/W}$

FWD thermal model values

$R$ (K/W)	$\tau$ (s)
2,86E-02	5,43E+00
5,04E-02	9,81E-01
7,36E-02	1,80E-01
1,26E-01	4,67E-02
4,07E-02	1,41E-02
1,25E-02	2,87E-03
1,67E-02	3,56E-04



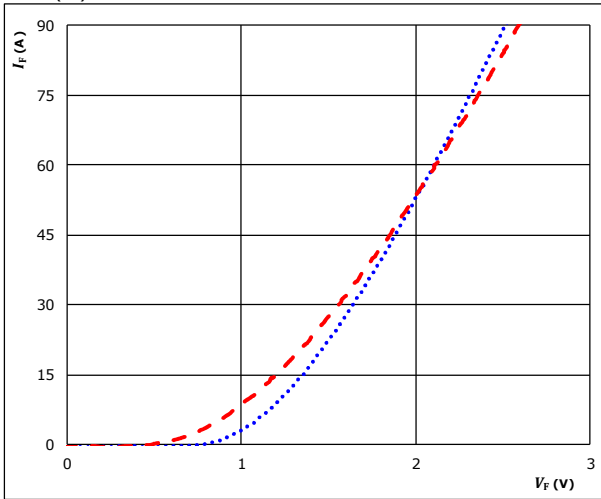


## Boost Sw. Protection Diode Characteristics

**figure 1.** FWD

Typical forward characteristics

$$I_F = f(V_F)$$

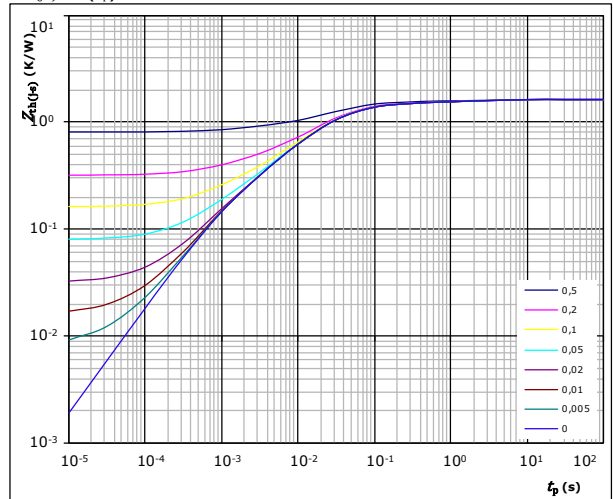


$t_p = 250 \mu s$   $T_j: 25 \text{ }^\circ C$  (blue dotted line)  $150 \text{ }^\circ C$  (red dashed line)

**figure 2.** FWD

Transient thermal impedance as a function of pulse width

$$Z_{th(j-s)} = f(t_p)$$



$D = t_p / T$   
 $R_{th(j-s)} = 1,61 \text{ K/W}$   
 FWD thermal model values

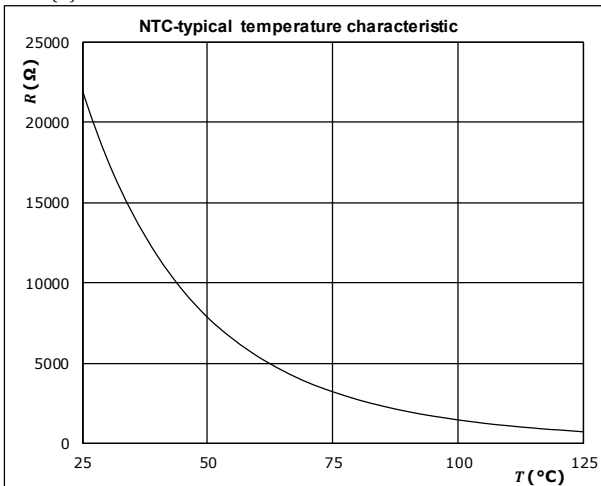
$R \text{ (K/W)}$	$\tau \text{ (s)}$
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

## Thermistor Characteristics

**figure 1.** Thermistor

Typical NTC characteristic as a function of temperature

$$R = f(T)$$

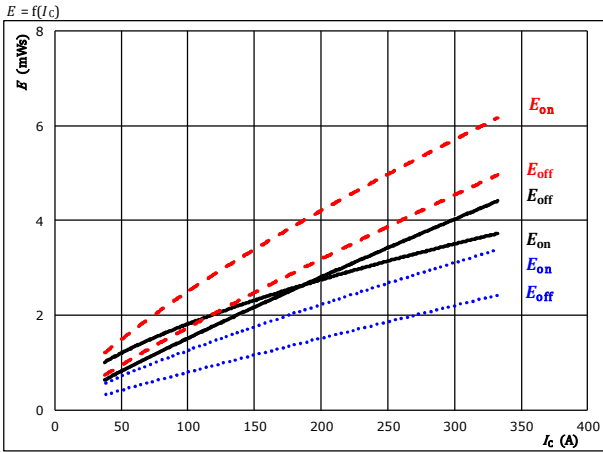




## Buck Switching Characteristics

**figure 1.** IGBT

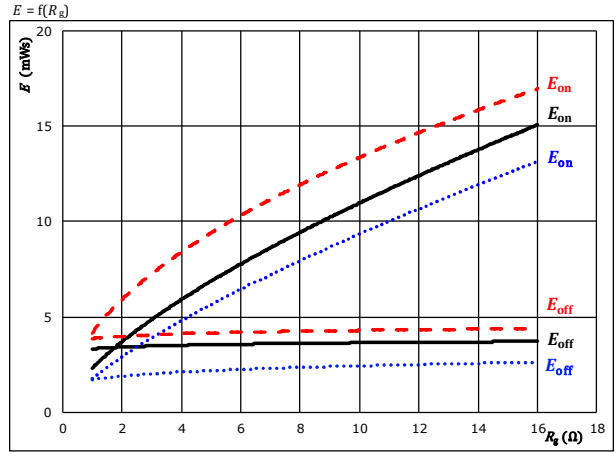
Typical switching energy losses as a function of collector current



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$   
 $T_j: 25$  °C (dotted blue)  
 $125$  °C (solid black)  
 $150$  °C (dashed red)

**figure 2.** IGBT

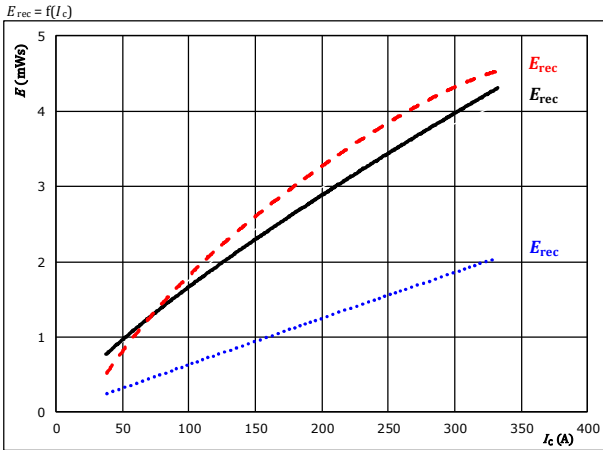
Typical switching energy losses as a function of gate resistor



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 252$  A  
 $T_j: 25$  °C (dotted blue)  
 $125$  °C (solid black)  
 $150$  °C (dashed red)

**figure 3.** FWD

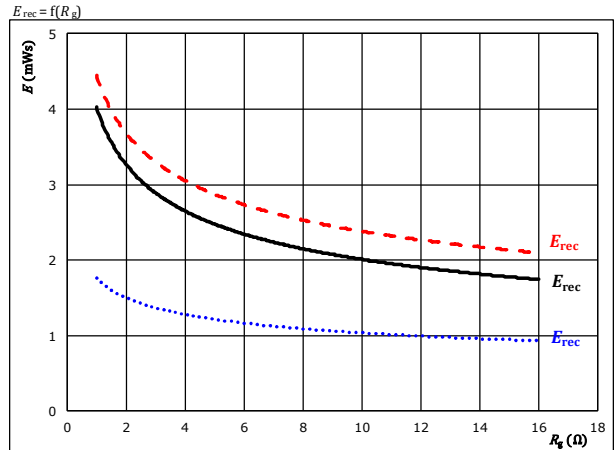
Typical reverse recovered energy loss as a function of collector current



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$   
 $T_j: 25$  °C (dotted blue)  
 $125$  °C (solid black)  
 $150$  °C (dashed red)

**figure 4.** FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 252$  A  
 $T_j: 25$  °C (dotted blue)  
 $125$  °C (solid black)  
 $150$  °C (dashed red)

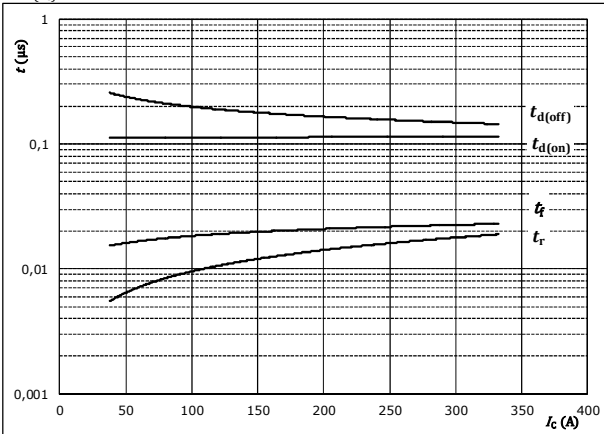


## Buck Switching Characteristics

**figure 5.** IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



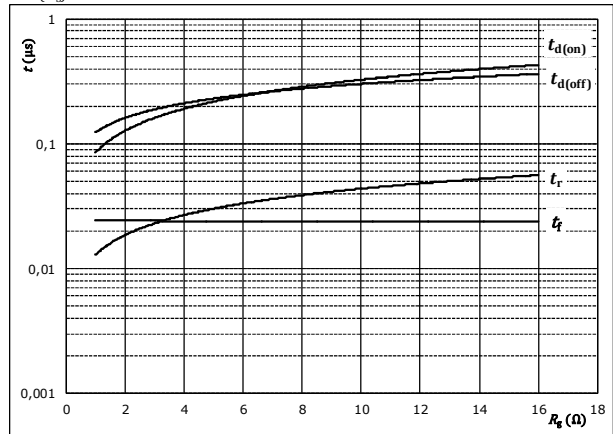
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$R_{g\text{on}} =$	2	Ω
$R_{g\text{off}} =$	2	Ω

**figure 6.** IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



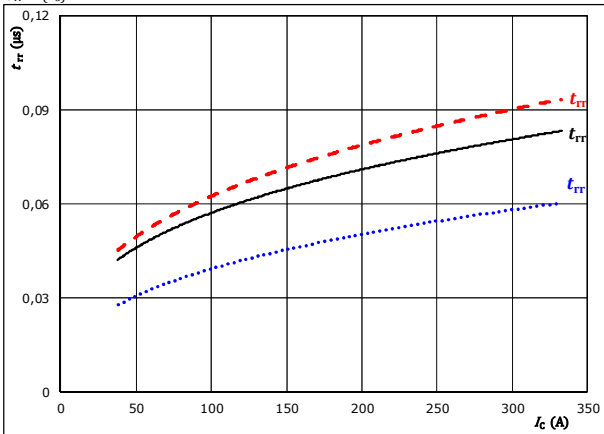
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	350	V
$V_{GE} =$	±15	V
$I_C =$	252	A

**figure 7.** FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

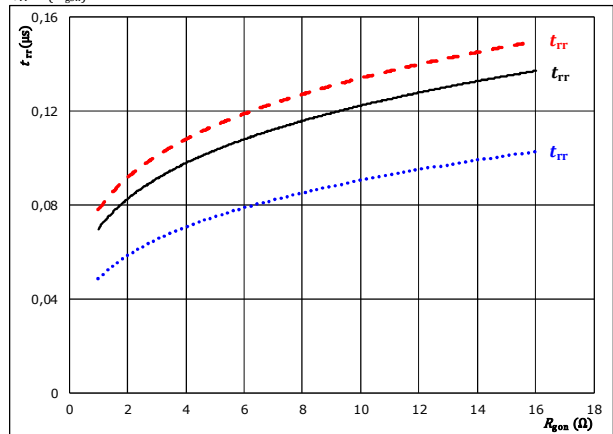


At	$V_{CE} =$	350	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$R_{g\text{on}} =$	2	Ω		150 °C	- - - -

**figure 8.** FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$$t_{rr} = f(R_{g\text{on}})$$



At	$V_{CE} =$	350	V	$T_j:$	25 °C	.....
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	252	A		150 °C	- - - -

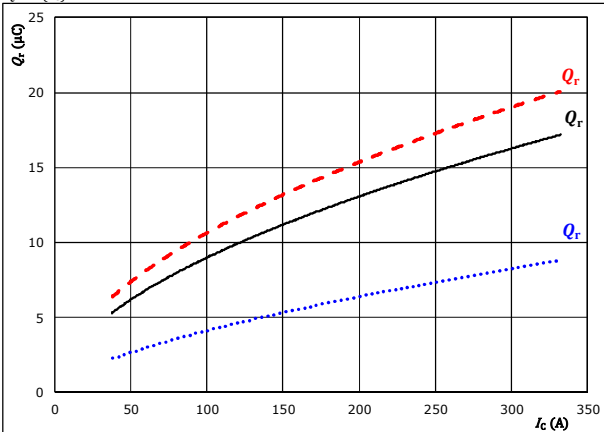


## Buck Switching Characteristics

**figure 9.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

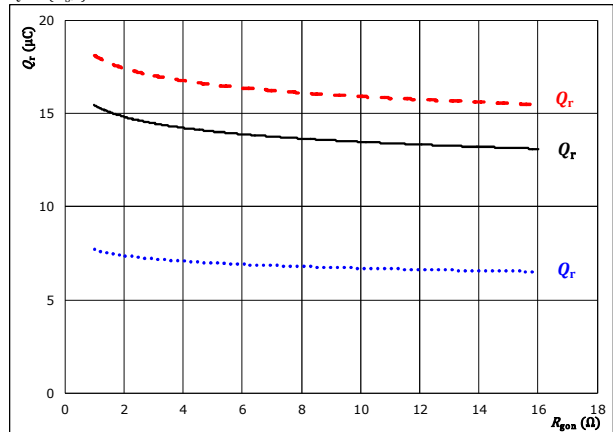


At  $V_{CE} = 350$  V  $T_j = 25$  °C  $\dots\dots\dots$   
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  $\text{---}$   
 $R_{gpn} = 2$  Ω  $T_j = 150$  °C  $\text{---}$

**figure 10.** FWD

Typical recovered charge as a function of IGBT turn on gate resistor

$$Q_r = f(R_{gpn})$$

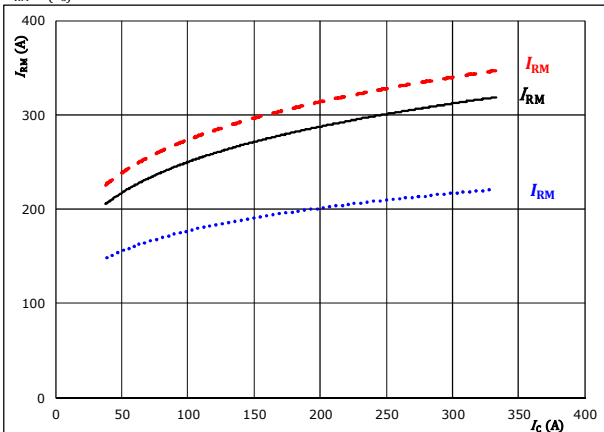


At  $V_{CE} = 350$  V  $T_j = 25$  °C  $\dots\dots\dots$   
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  $\text{---}$   
 $I_c = 252$  A  $T_j = 150$  °C  $\text{---}$

**figure 11.** FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$

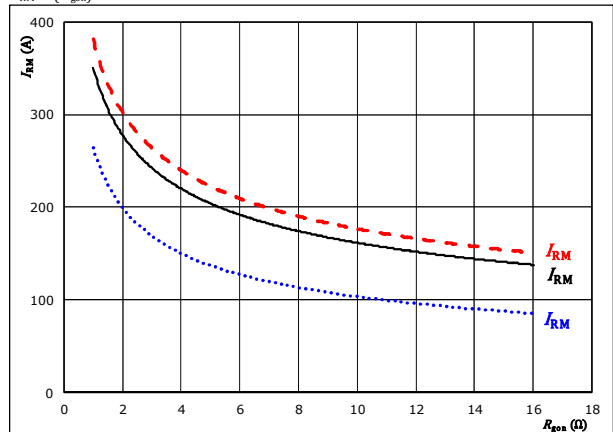


At  $V_{CE} = 350$  V  $T_j = 25$  °C  $\dots\dots\dots$   
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  $\text{---}$   
 $R_{gpn} = 2$  Ω  $T_j = 150$  °C  $\text{---}$

**figure 12.** FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$$I_{RM} = f(R_{gpn})$$



At  $V_{CE} = 350$  V  $T_j = 25$  °C  $\dots\dots\dots$   
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  $\text{---}$   
 $I_c = 252$  A  $T_j = 150$  °C  $\text{---}$



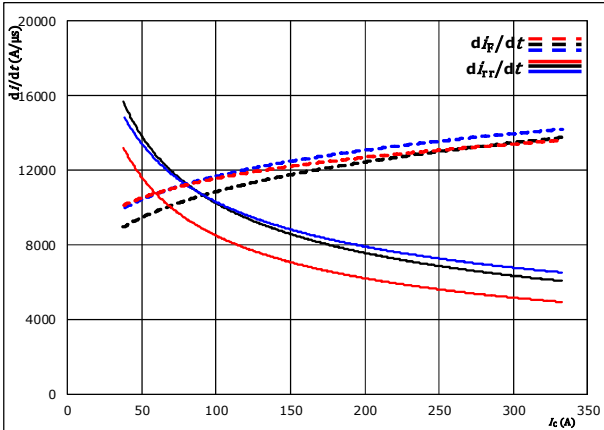
Vincotech

**30-FT07NIB300S503-LH36F58**  
**30-PT07NIB300S503-LH36F58Y**  
 datasheet

## Buck Switching Characteristics

**figure 13.** FWD

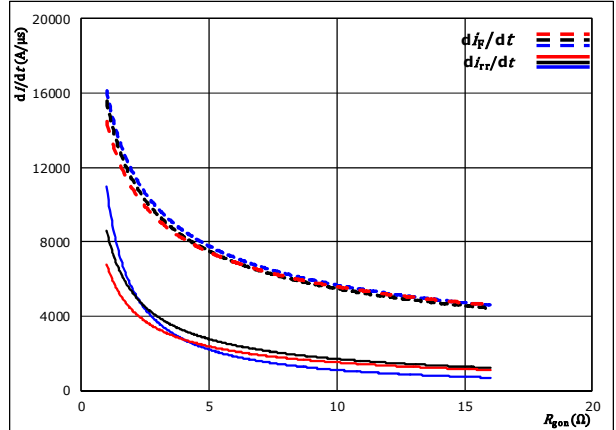
Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_{rr}/dt = f(I_c)$



At  $V_{CE} = 350$  V  $T_j = 25$  °C  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  
 $R_{gpn} = 2$  Ω  $T_j = 150$  °C

**figure 14.** FWD

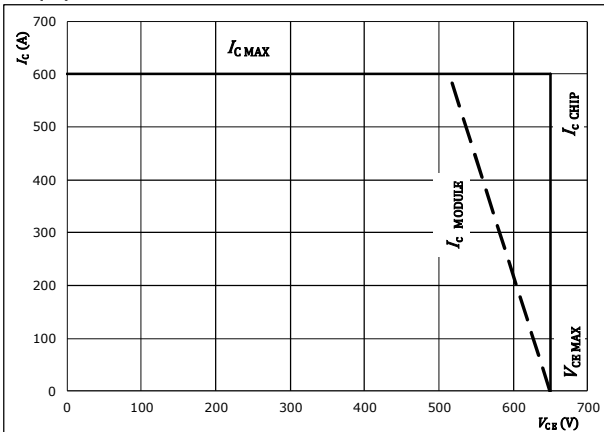
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{gpn})$



At  $V_{CE} = 350$  V  $T_j = 25$  °C  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  
 $I_c = 252$  A  $T_j = 150$  °C

**figure 15.** IGBT

Reverse bias safe operating area  
 $I_c = f(V_{CB})$



At  $T_j = 125$  °C  
 $R_{gpn} = 2$  Ω  
 $R_{goff} = 2$  Ω

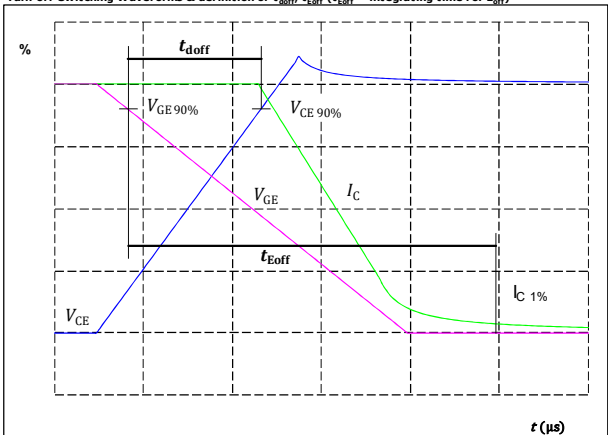


## Buck Switching Definitions

General conditions		
$T_j$	=	125 °C
$R_{\theta on}$	=	2 Ω
$R_{\theta off}$	=	2 Ω

**figure 1.** IGBT

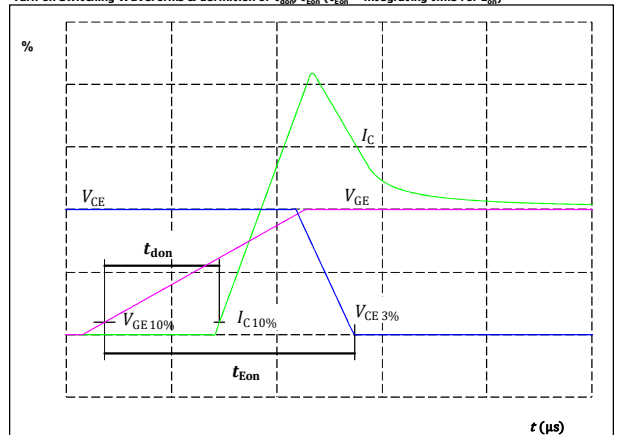
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{doff} =$	148	ns

**figure 2.** IGBT

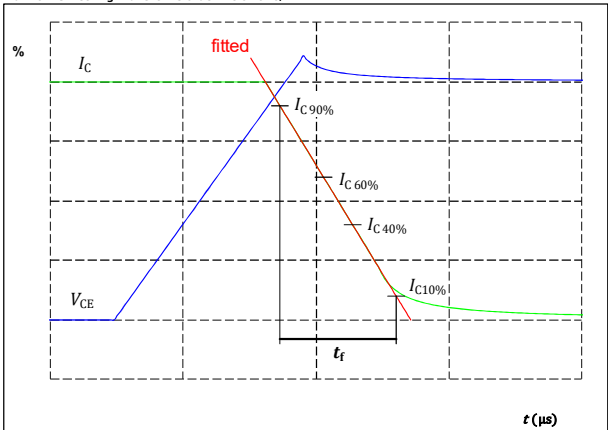
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{don} =$	116	ns

**figure 3.** IGBT

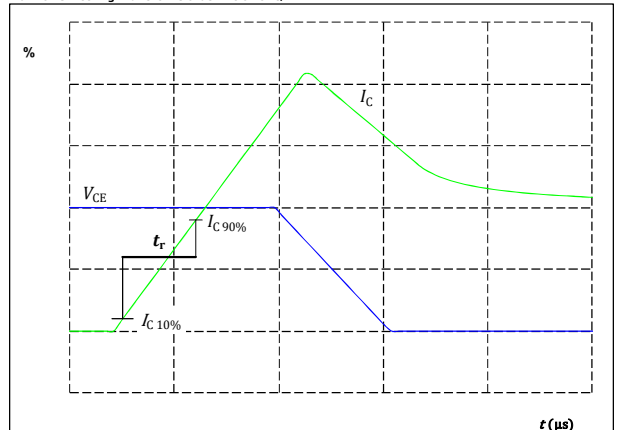
Turn-off Switching Waveforms & definition of  $t_r$



$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	21	ns

**figure 4.** IGBT

Turn-on Switching Waveforms & definition of  $t_r$

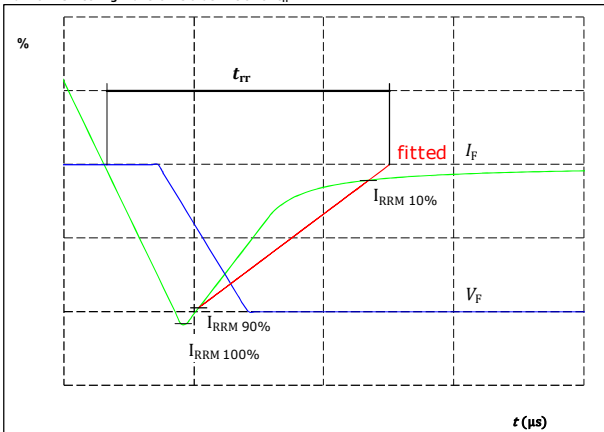


$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	18	ns



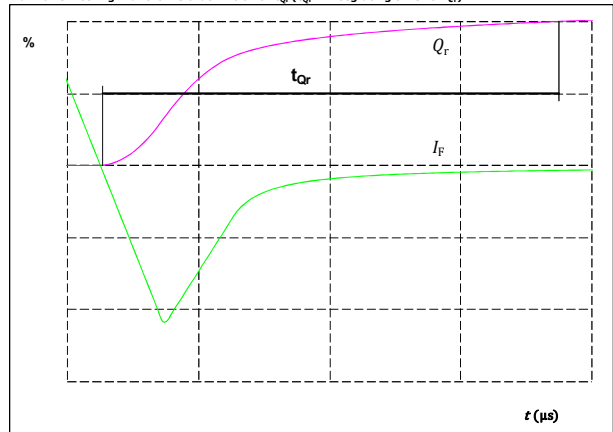
## Buck Switching Characteristics

**figure 5.** FWD  
 Turn-off Switching Waveforms & definition of  $t_{rr}$



$V_F(100\%) =$	350	V
$I_F(100\%) =$	252	A
$I_{RRM}(100\%) =$	298	A
$t_{rr} =$	77	ns

**figure 6.** FWD  
 Turn-on Switching Waveforms & definition of  $t_{Qr}$  ( $t_{Qr}$  = integrating time for  $Q_r$ )



$I_F(100\%) =$	252	A
$Q_r(100\%) =$	14,87	$\mu\text{C}$

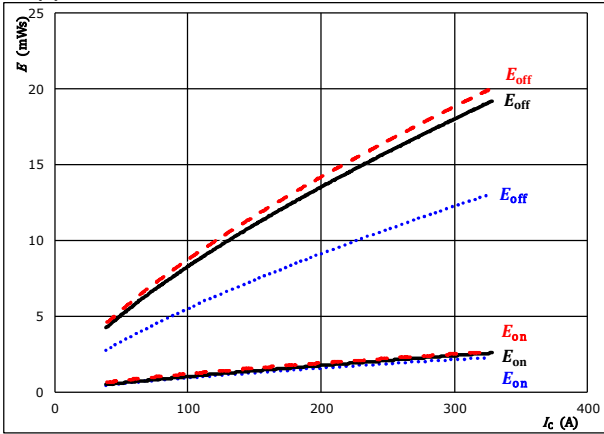


## Boost Switching Characteristics

**figure 1.** IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



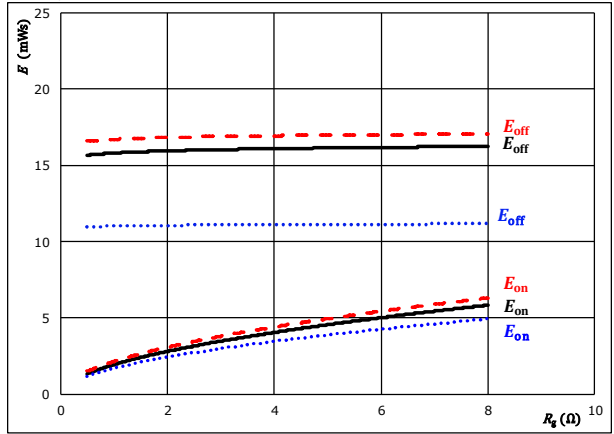
With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$

$T_j$ : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 2.** IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



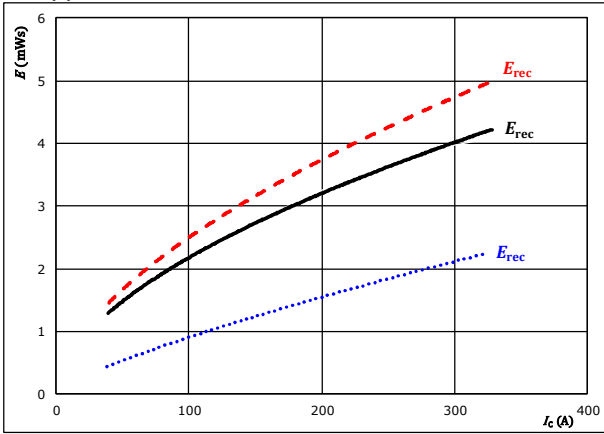
With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 252$  A

$T_j$ : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 3.** FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_c)$$



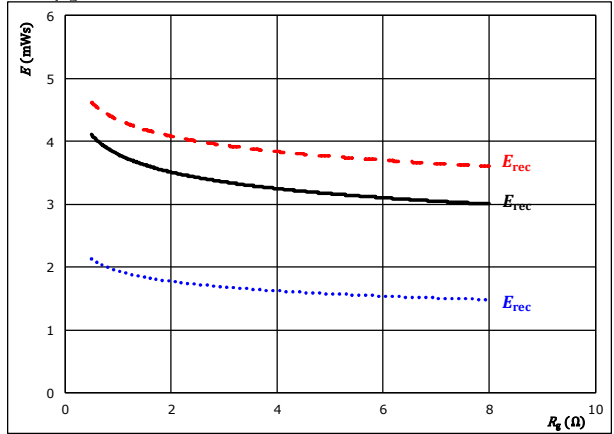
With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$

$T_j$ : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 4.** FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 252$  A

$T_j$ : 25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

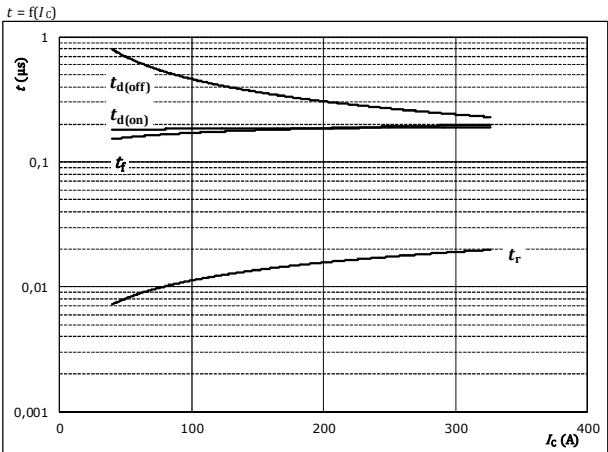




## Boost Switching Characteristics

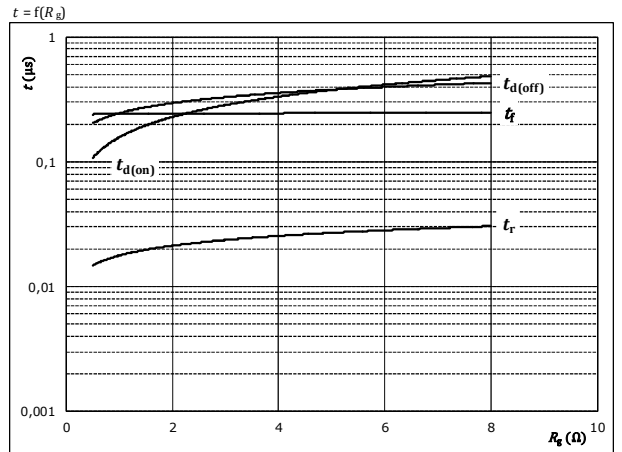
**figure 5.** IGBT

Typical switching times as a function of collector current



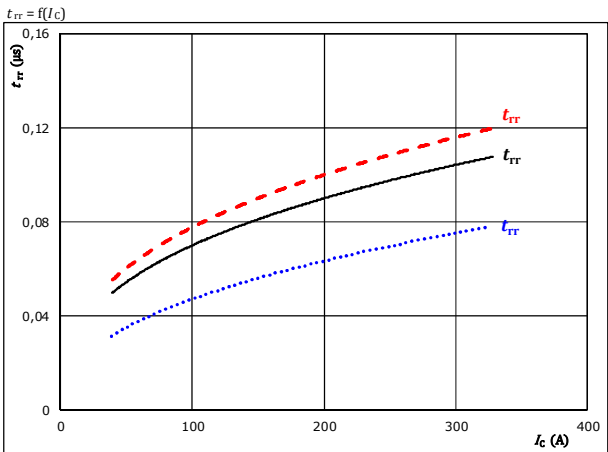
**figure 6.** IGBT

Typical switching times as a function of gate resistor



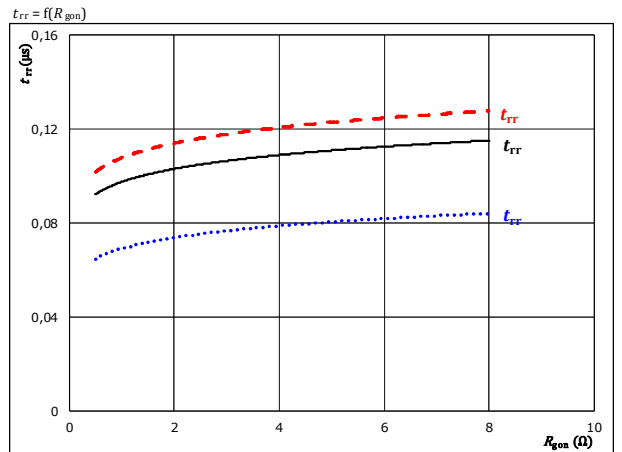
**figure 7.** FWD

Typical reverse recovery time as a function of collector current



**figure 8.** FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor



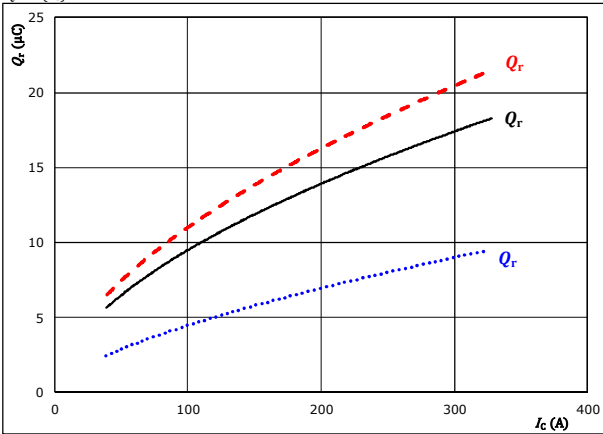


## Boost Switching Characteristics

**figure 9.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

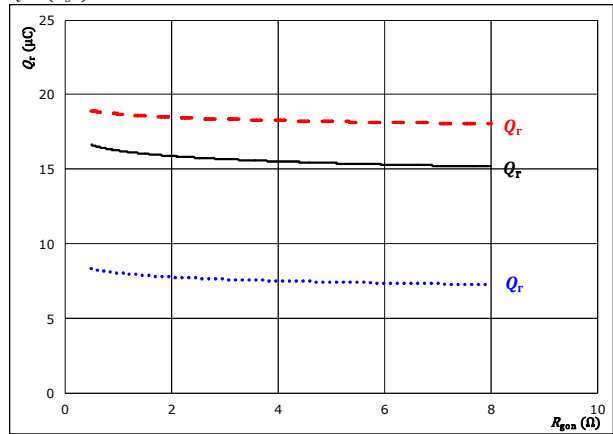


With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$   
 $T_j:$  25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 10.** FWD

Typical recovered charge as a function of IGBT turn on gate resistor

$$Q_r = f(R_{gon})$$

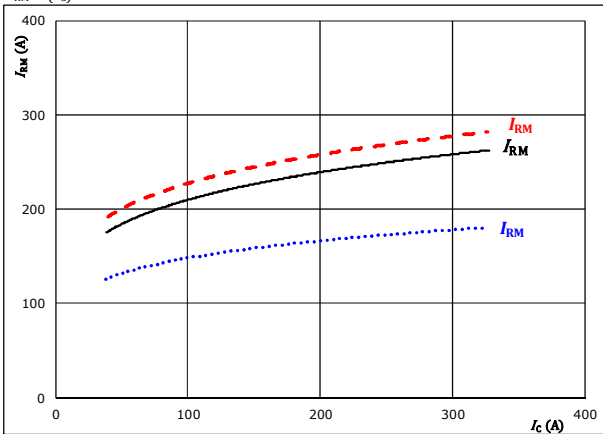


With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 252$  A  
 $T_j:$  25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 11.** FWD

Typical peak reverse recovery current current as a function of collector current

$$I_{RM} = f(I_c)$$

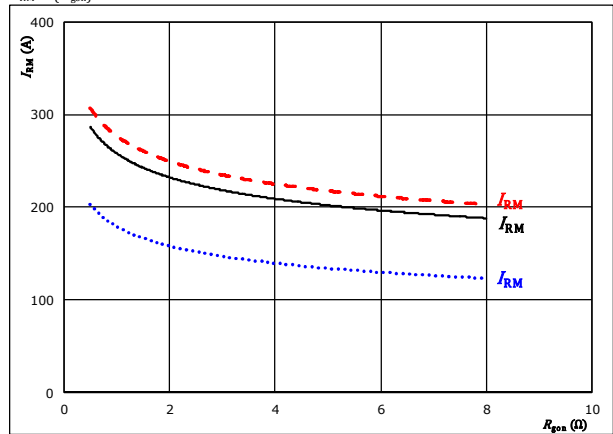


With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 2$   $\Omega$   
 $T_j:$  25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)

**figure 12.** FWD

Typical peak reverse recovery current current as a function of IGBT turn on gate resistor

$$I_{RM} = f(R_{gon})$$



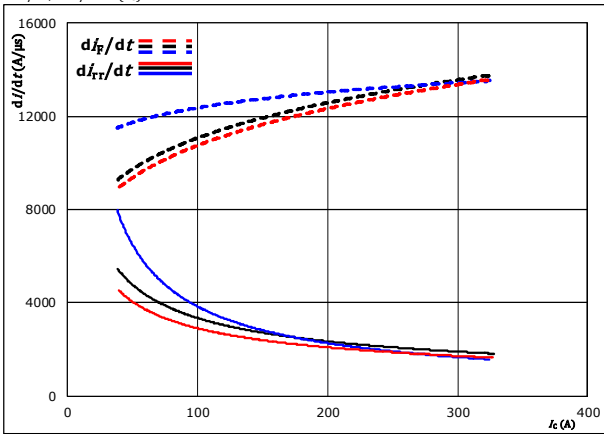
With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 252$  A  
 $T_j:$  25 °C (blue dotted), 125 °C (black solid), 150 °C (red dashed)



## Boost Switching Characteristics

**figure 13.** FWD

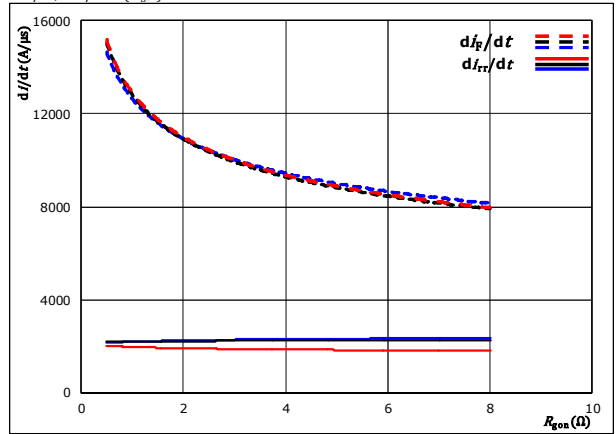
Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_{rr}/dt = f(I_c)$



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $R_{g(on)} = 2$   $\Omega$   
 $T_j = 25$  °C  
 $125$  °C  
 $150$  °C

**figure 14.** FWD

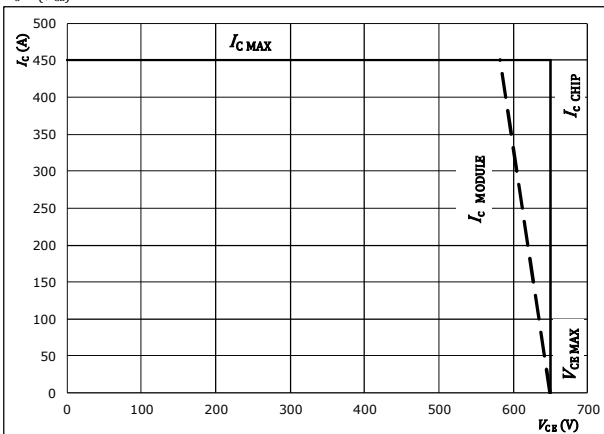
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{g(on)})$



With an inductive load at  
 $V_{CE} = 350$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 252$  A  
 $T_j = 25$  °C  
 $125$  °C  
 $150$  °C

**figure 15.** IGBT

Reverse bias safe operating area  
 $I_C = f(V_{CB})$



At  
 $T_j = 125$  °C  
 $R_{g(on)} = 2$   $\Omega$   
 $R_{g(off)} = 2$   $\Omega$

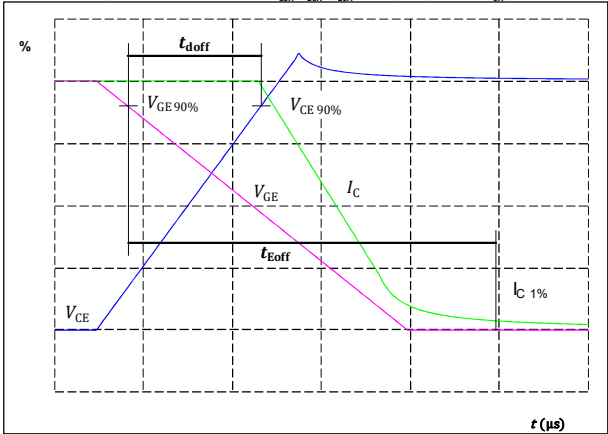


## Boost Switching Definitions

General conditions		
$T_j$	=	125 °C
$R_{gon}$	=	2 $\Omega$
$R_{goff}$	=	2 $\Omega$

**figure 1.** IGBT

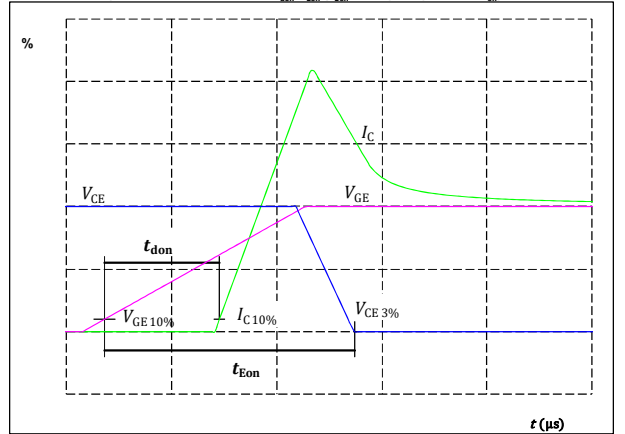
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{doff} =$	253	ns

**figure 2.** IGBT

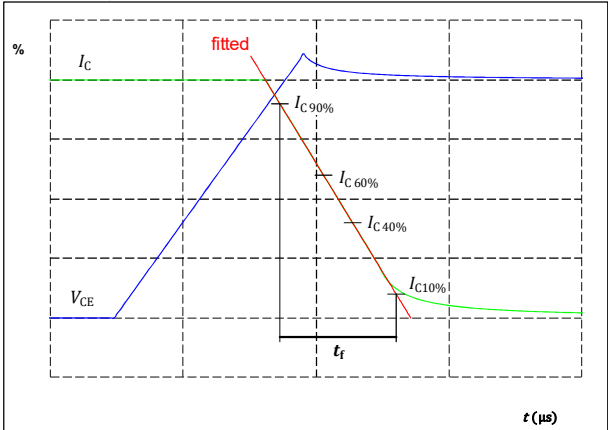
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_{don} =$	188	ns

**figure 3.** IGBT

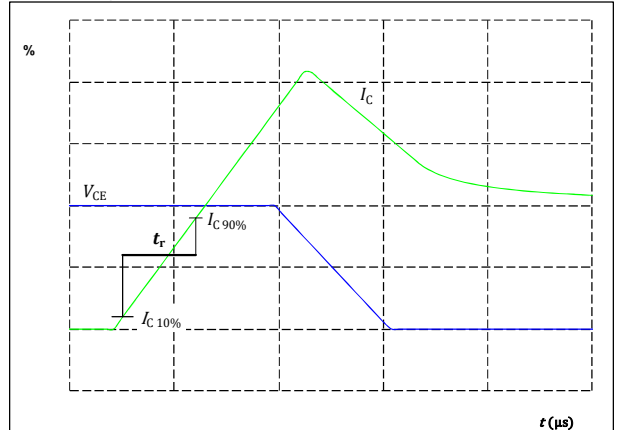
Turn-off Switching Waveforms & definition of  $t_r$



$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	210	ns

**figure 4.** IGBT

Turn-on Switching Waveforms & definition of  $t_r$



$V_C(100\%) =$	350	V
$I_C(100\%) =$	252	A
$t_r =$	18	ns



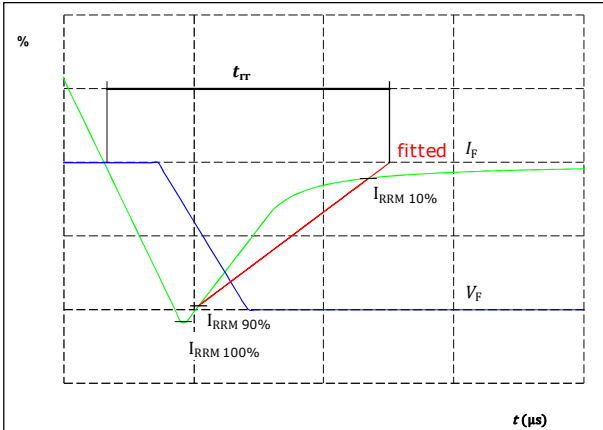
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**30-FT07NIB300S503-LH36F58**  
**30-PT07NIB300S503-LH36F58Y**  
 datasheet

## Boost Switching Characteristics

figure 5. FWD

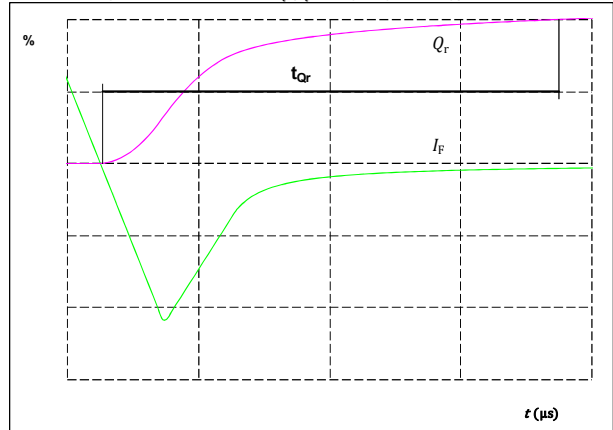
Turn-off Switching Waveforms & definition of  $t_{rr}$



$V_F(100\%) =$	350	V
$I_F(100\%) =$	252	A
$I_{RRM}(100\%) =$	254	A
$t_{rr} =$	99	ns

figure 6. FWD

Turn-on Switching Waveforms & definition of  $t_{Qr}$  ( $t_{Qr}$  = integrating time for  $Q_r$ )



$I_F(100\%) =$	252	A
$Q_r(100\%) =$	16,20	$\mu\text{C}$



# 30-FT07NIB300S503-LH36F58 30-PT07NIB300S503-LH36F58Y

datasheet

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Ordering Code & Marking								
Version			Ordering Code					
without thermal paste with 13mm housing with Solder pins			30-FT07NIB300S503-LH36F58					
without thermal paste with 13mm housing with Press-fit pins			30-PT07NIB300S503-LH36F58Y					
NN-NNNNNNNNNNNN TTTTIV WWYY UL VIN LLLL SSSS			Text	Name	Date code	UL & VIN	Lot	Serial
				NN-NNNNNNNNNNNN-TTTTIV WWYY UL VIN LLLLL SSSS				
			Datamatrix	Type&Ver	Lot number	Serial	Date code	
			TTTTIV	LLLL	SSSS	WWYY		

Outline							
Pin table				Pin table			
Pin	X	Y	Function	Pin	X	Y	Function
1	70,25	6	DC+2	48	45,75	36	Ph2
2	70,25	3	DC+2	49	48,25	36	Ph2
3	70,25	0	DC+2	50	50,75	36	Ph2
4	67,75	3	DC+2	51	64,45	36,6	Therm1
5	67,75	0	DC+2	52	70,85	36,55	Therm2
6	65,25	0	DC+2	53	45,95	24,05	S13
7	58	0	GND2	54	48,95	24,05	G13
8	55,5	0	GND2	55	48,75	12,85	TM15
9	53	0	GND2	56	59,05	16,8	TM11
10	50,5	0	GND2	57	59,45	22	S11
11	43,25	3	DC-2	58	62,45	22	G11
12	43,25	0	DC-2				
13	40,75	3	DC-2				
14	40,75	0	DC-2				
15	38,25	3	DC-2				
16	38,25	0	DC-2				
17	32,25	3	DC-1				
18	32,25	0	DC-1				
19	29,75	3	DC-1				
20	29,75	0	DC-1				
21	27,25	3	DC-1				
22	27,25	0	DC-1				
23	20	0	GND1				
24	17,5	0	GND1				
25	15	0	GND1				
26	12,5	0	GND1				
27	5,25	3	DC+1				
28	5,25	0	DC+1				
29	2,75	3	DC+1				
30	2,75	0	DC+1				
31	0,25	3	DC+1				
32	0,25	0	DC+1				
33	20,1	13,75	TM12				
34	32,5	23,55	S12				
35	29,5	23,55	G12				
36	20,2	23,95	S14				
37	17,2	25,55	G14				
38	0	16,15	TM14				
39	2,25	36	Ph1				
40	4,75	36	Ph1				
41	7,25	36	Ph1				
42	9,75	36	Ph1				
43	12,25	36	Ph1				
44	14,75	36	Ph1				
45	38,25	36	Ph2				
46	40,75	36	Ph2				
47	43,25	36	Ph2				

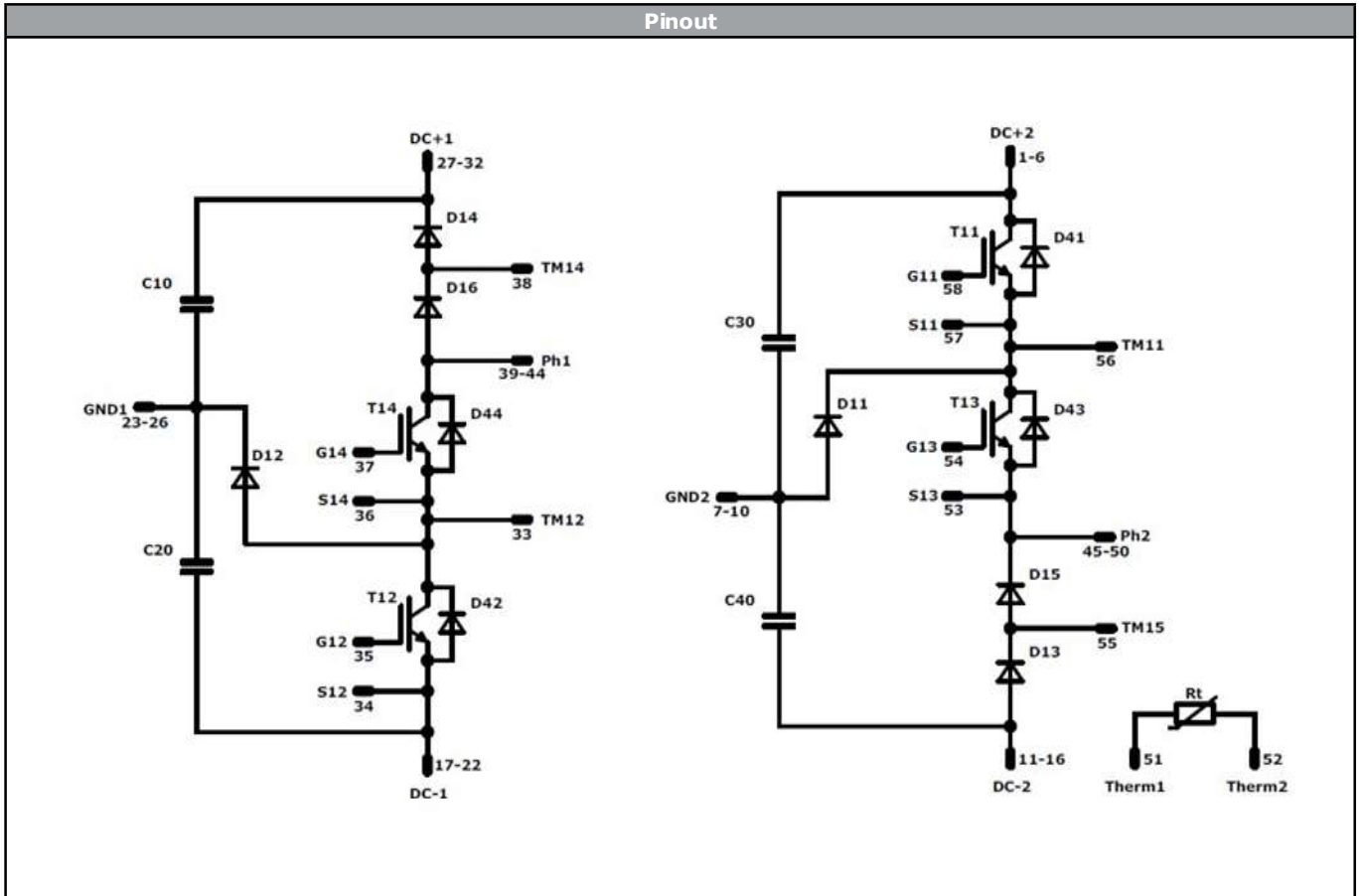
  

Technical drawings showing side views and a top view of the component. Dimensions include pin diameter  $\phi 1\pm 0,05$ , housing height  $17,2 \pm 0,5$ , and a total height of  $17,4 \pm 0,5$ . A note indicates: "center of press-fit pinhead for connection parameter see the handling instruction". The top view shows a rectangular component with a width of 35,25 and a height of 18, with various pins numbered 1 through 58.

Tolerance of pinpositions:  $\pm 0,5$ mm at the end of pins  
Dimension of coordinate axis is only offset without tolerance



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<b>Identification</b>					
<b>ID</b>	<b>Component</b>	<b>Voltage</b>	<b>Current</b>	<b>Function</b>	<b>Comment</b>
T11, T12	IGBT	650 V	300 A	Buck Switch	
D11, D12	FWD	650 V	300 A	Buck Diode	
D41, D42	FWD	650 V	30 A	Buck Sw. Protection Diode	
T13, T14	IGBT	650 V	225 A	Boost Switch	
D13, D14	FWD	650 V	300 A	Boost Diode	
D15, D16	FWD	650 V	300 A	Boost Sw.Inv.Diode	
D43, D44	FWD	650 V	30 A	Boost Sw. Protection Diode	
C10, C20, C30, C40	Capacitor	630 V		Capacitor (DC)	
Rt	NTC			Thermistor	




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Packaging instruction			
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 2</i> packages see vincotech.com website.

Package data
Package data for <i>flow 2</i> packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website. 

Document No.:	Date:	Modification:	Pages
30-xT07NIB300S503-LH36F58x-D3-14	17 Apr. 2019	Correction of I <sub>c</sub> /I <sub>f</sub> values	2,3

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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