



flowNPC 2

1500 V / 375 A

Features

- High speed IGBT
- Integrated NTC
- Three-level high efficient topology

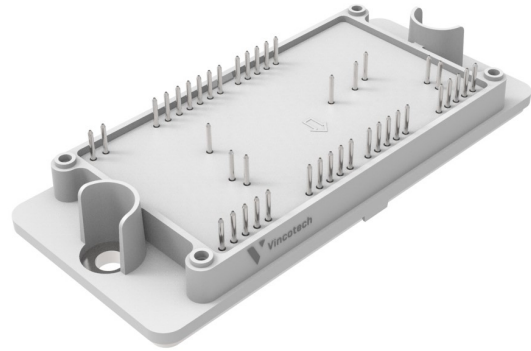
Target applications

- Solar Inverters

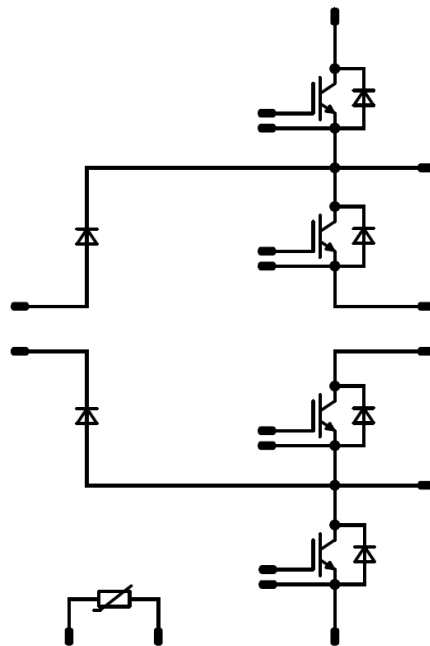
Types

- 30-FT10NIA375F9-LQ08F08

flow 2 13 mm housing



Schematic





Vincotech

30-FT10NIA375F9-LQ08F08
datasheet

Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
NPC BUCK Switch				
Collector-emitter voltage	V_{CES}		950	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	219	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	1125	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	431	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$
NPC BUCK Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	104	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	455	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p = 10\text{ ms}$	650	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	218	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$
NPC BOOST Switch				
Collector-emitter voltage	V_{CES}		950	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	243	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	337	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
NPC BOOST Diode				
Peak repetitive reverse voltage	V_{RRM}		950	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	129	A
Surge (non-repetitive) forward current	I_{FSM}	$T_j = 25\text{ °C}$	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	225	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Sw. Inv. Diode

Peak repetitive reverse voltage	V_{RRM}		950	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	129	A
Surge (non-repetitive) forward current	I_{FSM}	$T_j = 25\text{ °C}$	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	225	W
Maximum junction temperature	T_{jmax}		175	°C

Module Properties

Thermal Properties

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

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	4000	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		600	

*100 % tested in production



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

NPC BUCK Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,38	25	3,2	4,67	5,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		375	25 125 150		1,98 2,32 2,42	2,11	V
Collector-emitter cut-off current	I_{CES}		0	950		25			1250	μA
Gate-emitter leakage current	I_{GES}		20	0		25			2000	nA
Internal gate resistance	r_g							0,342		Ω
Input capacitance	C_{ies}							25025		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30		25		486,5		pF
Reverse transfer capacitance	C_{res}							110		pF
Gate charge	Q_g		15	600	375	25		735		nC

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,22		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		85 85,8 85,8		ns
Rise time	t_r	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$				25 125 150		18 21 22,2		ns
Turn-off delay time	$t_{d(off)}$		±15	600	140	25 125 150		141,8 181,4 190,4		ns
Fall time	t_f					25 125 150		11,76 13,4 14,45		ns
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 0,826 \mu C$ $Q_{rFWD} = 0,855 \mu C$ $Q_{rFWD} = 0,823 \mu C$				25 125 150		1,84 2,37 2,5		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,45 6,5 7,26		mWs



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

NPC BUCK Diode

Static

Forward voltage	V_F				100	25 125 150		1,51 1,77 1,91	1,8	V
Reverse leakage current	I_R	$V_T = 1200$ V				25		175	1000	μA

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,44		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Dynamic

Peak recovery current	I_{RRM}					25 125 150		55,05 51 48,74		A
Reverse recovery time	t_{rr}					25 125 150		25,81 27 26,5		ns
Recovered charge	Q_r	$di/dt=6030$ A/μs $di/dt=4960$ A/μs $di/dt=3968$ A/μs	±15	600	140	25 125 150		0,826 0,855 0,823		μC
Reverse recovered energy	E_{rec}					25 125 150		0,214 0,235 0,214		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		5364 4961 4299		A/μs



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

NPC BOOST Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,3	25	3,2	4,36	5,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		300	25 125 150		1,35 1,44 1,47	1,69	V
Collector-emitter cut-off current	I_{CES}		0	950		25			1000	μA
Gate-emitter leakage current	I_{GES}		20	0		25			1600	nA
Internal gate resistance	r_g							0,462		Ω
Input capacitance	C_{ies}							60600		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	30		25		496		pF
Reverse transfer capacitance	C_{res}							99,6		pF
Gate charge	Q_g		15	600	300	25		2772		nC

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,28		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		275,6 279 282		ns
Rise time	t_r	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$				25 125 150		25,2 30,4 31,6		ns
Turn-off delay time	$t_{d(off)}$		±15	600	140	25 125 150		387,4 451,2 466,2		ns
Fall time	t_f					25 125 150		15,81 21,33 23,87		ns
Turn-on energy (per pulse)	E_{on}	$Q_{rFWD} = 6,9 \mu C$ $Q_{rFWD} = 15,84 \mu C$ $Q_{rFWD} = 17,57 \mu C$				25 125 150		3,31 5,62 6,1		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		8,15 11,7 13,81		mWs



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

NPC BOOST Diode

Static

Forward voltage	V_F				150	25 125 150		2,12 1,96 1,91	2,51	V
Reverse leakage current	I_R	$V_T = 950$ V				25		0,6	20	μA

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,42		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Dynamic

Peak recovery current	I_{RRM}					25 125 150		156,22 189,13 185,09		A
Reverse recovery time	t_{rr}					25 125 150		93,33 183,91 214,98		ns
Recovered charge	Q_r	$di/dt=5040$ A/μs $di/dt=4818$ A/μs $di/dt=4168$ A/μs	±15	600	140	25 125 150		6,9 15,84 17,57		μC
Reverse recovered energy	E_{rec}					25 125 150		2,54 6,02 6,74		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		5304 2784 2401		A/μs



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Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
		V_{GS} [V]	V_{GE} [V]	V_{DS} [V]	V_{CE} [V]	T_j [°C]	Min	Typ	Max	

Boost Sw. Inv. Diode

Static

Forward voltage	V_F				150	25 125 150		2,12 1,96 1,91	2,51	V
Reverse leakage current	I_R	$V_i = 950$ V				25		0,6	20	μA

Thermal

Thermal resistance junction to sink*	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,42		K/W
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*Only valid with pre-applied Vincotech thermal interface material.

Thermistor

Static

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



NPC BUCK Switch Characteristics

figure 1. IGBT

Typical output characteristics
 $I_C = f(V_{CE})$

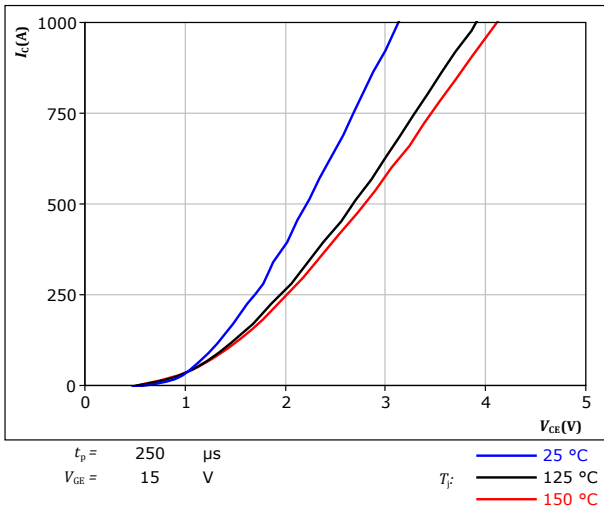


figure 2. IGBT

Typical output characteristics
 $I_C = f(V_{CE})$

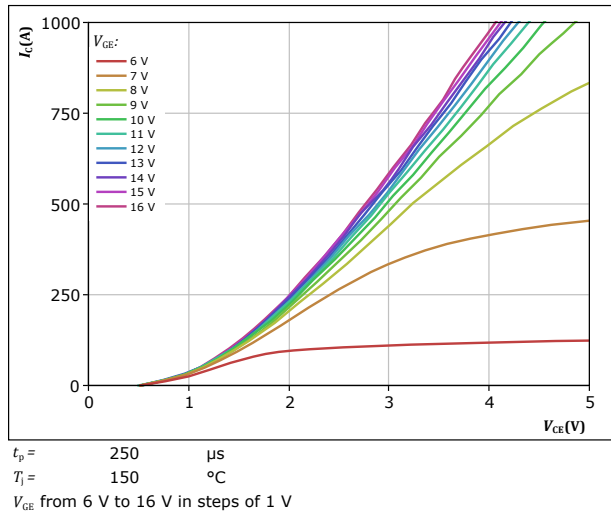


figure 3. IGBT

Typical transfer characteristics
 $I_C = f(V_{GE})$

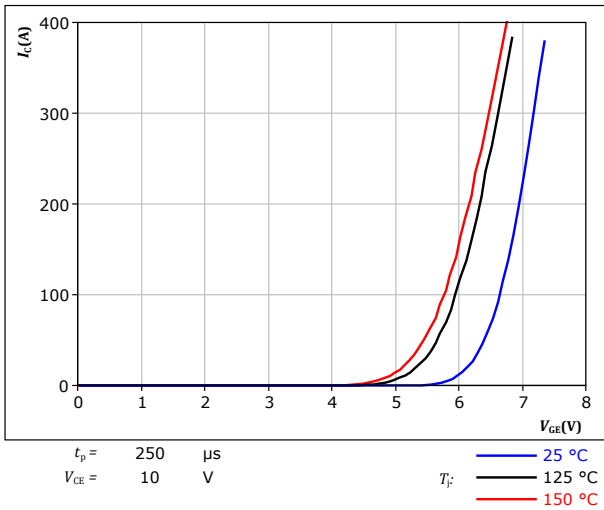
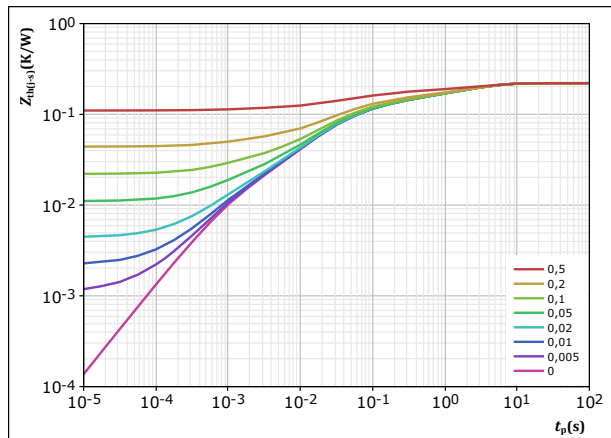


figure 4. IGBT

Transient thermal impedance as a function of pulse width
 $Z_{th(j-s)} = f(t_p)$



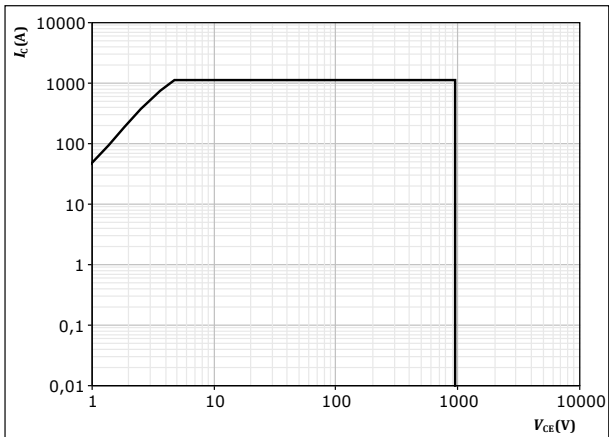


NPC BUCK Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



D = single pulse
T_s = 80 °C
V_{CE} = 15 V
T_j = T_{jmax}



NPC BUCK Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

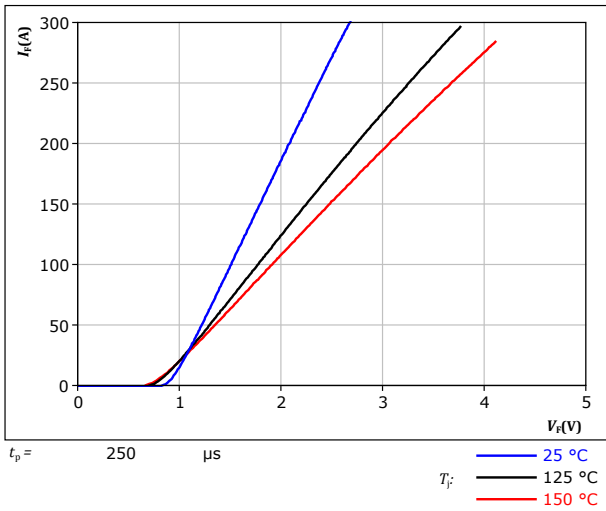
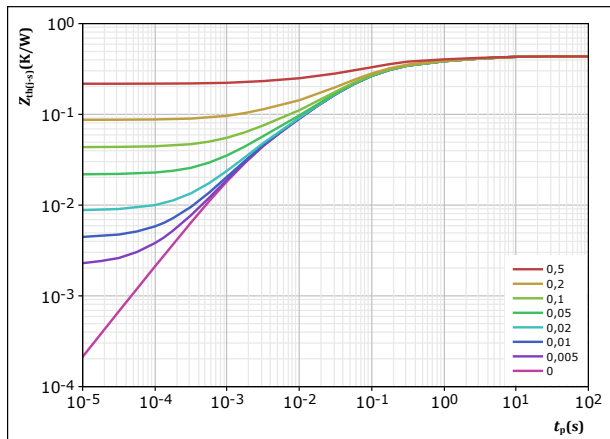


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)} = 0,435 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
4,84E-02	4,17E+00
7,23E-02	5,54E-01
2,07E-01	8,33E-02
7,86E-02	1,63E-02
2,91E-02	2,09E-03

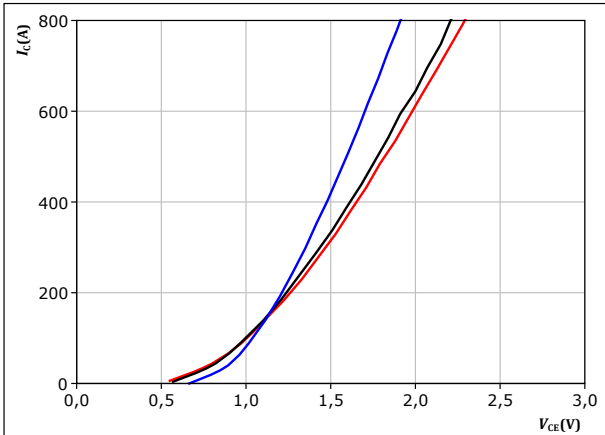


NPC BOOST Switch Characteristics

figure 8. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



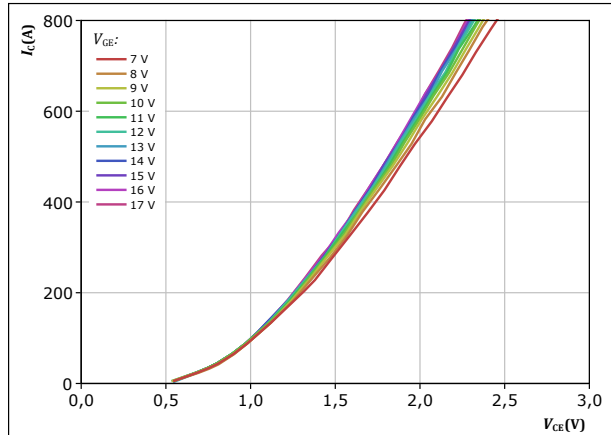
$t_p = 250 \mu s$
 $V_{GE} = 15 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 9. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

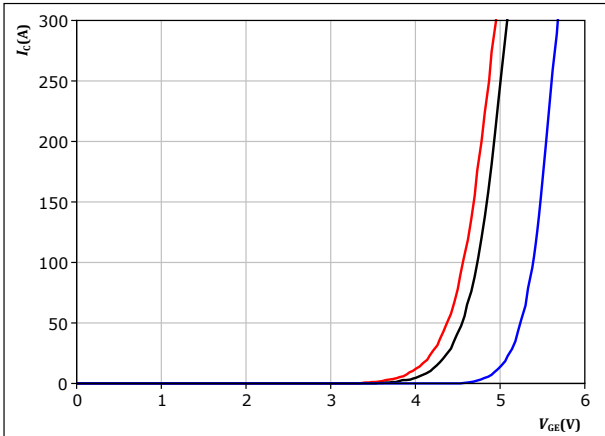


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$



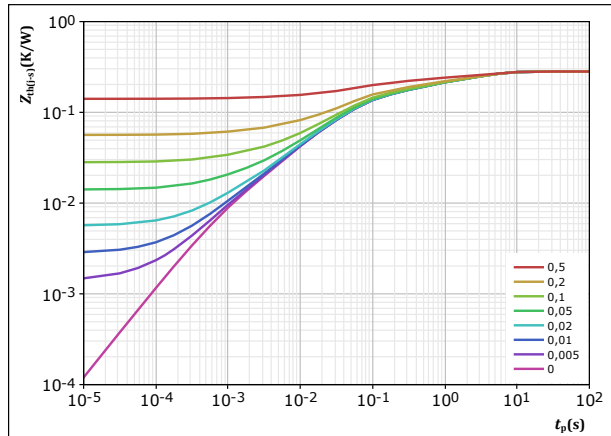
$t_p = 250 \mu s$
 $V_{CE} = 10 V$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,282 \text{ K/W}$

IGBT thermal model values

R (K/W)	τ (s)
8,41E-02	3,27E+00
6,01E-02	4,16E-01
1,10E-01	5,26E-02
2,23E-02	7,99E-03
5,87E-03	8,42E-04

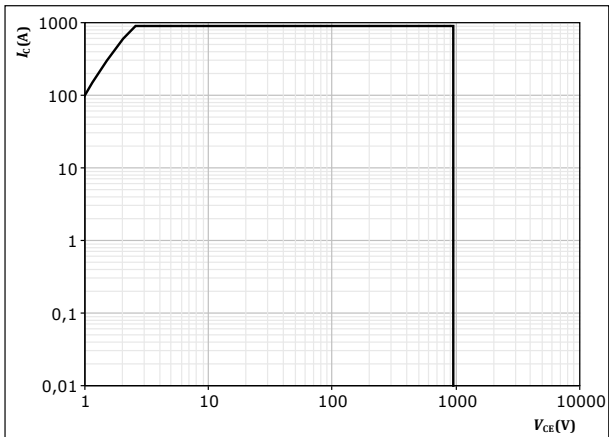


NPC BOOST Switch Characteristics

figure 12. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



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



NPC BOOST Diode Characteristics

figure 13. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

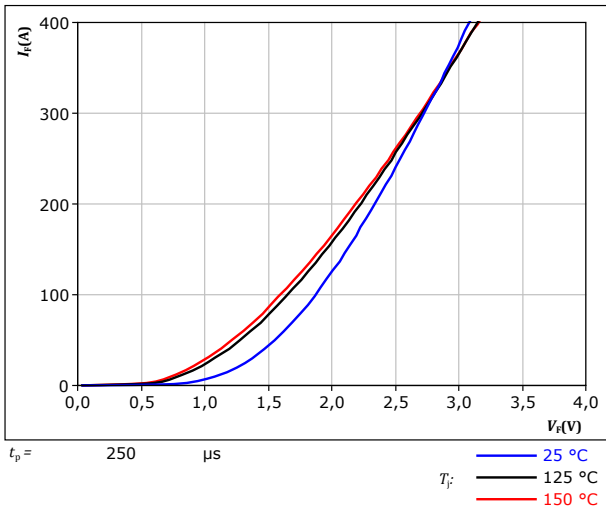
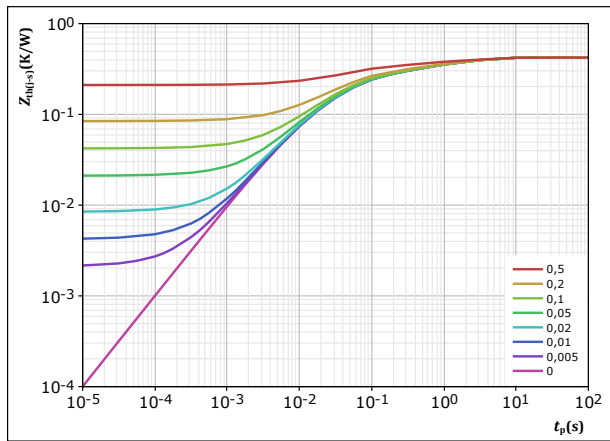


figure 14. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,422 \text{ K/W}$
 IGBT thermal model values

R (K/W)	τ (s)
9,85E-02	2,34E+00
9,72E-02	2,93E-01
1,74E-01	4,17E-02
3,69E-02	8,10E-03
1,49E-02	1,63E-02



Boost Sw. Inv. Diode Characteristics

figure 15. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

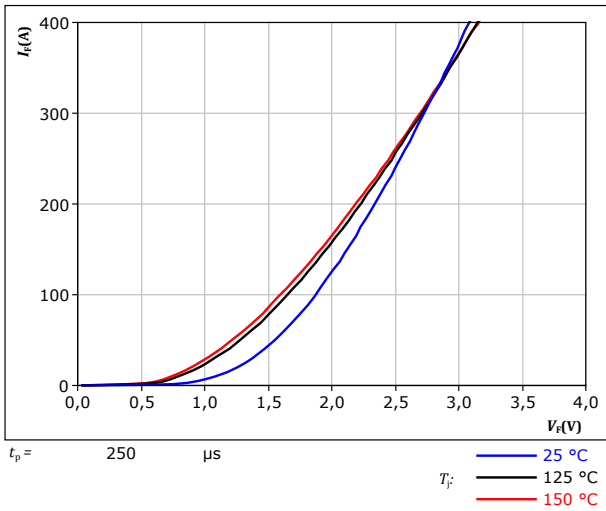
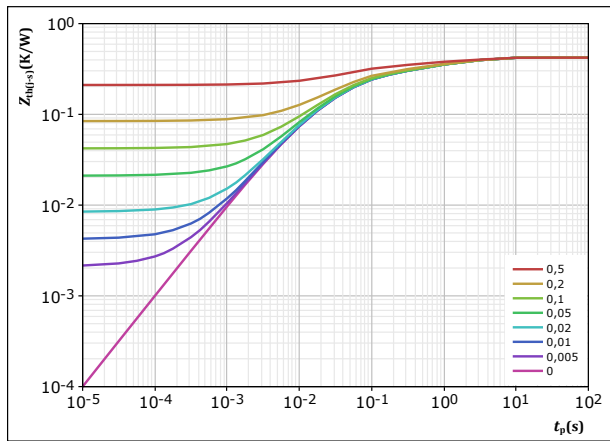


figure 16. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,422$ K/W
 IGBT thermal model values

R (K/W)	τ (s)
9,85E-02	2,34E+00
9,72E-02	2,93E-01
1,74E-01	4,17E-02
3,69E-02	8,10E-03
1,49E-02	1,63E-02

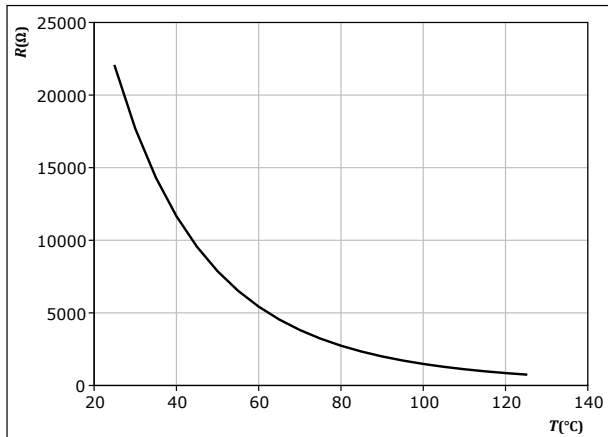


Thermistor Characteristics

figure 17. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

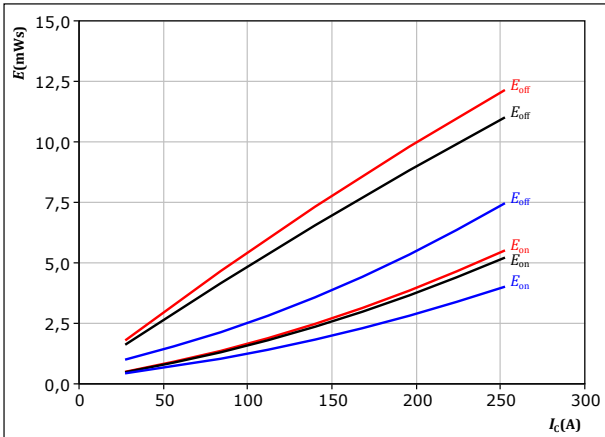




NPC BUCK Switching Characteristics

figure 18. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$



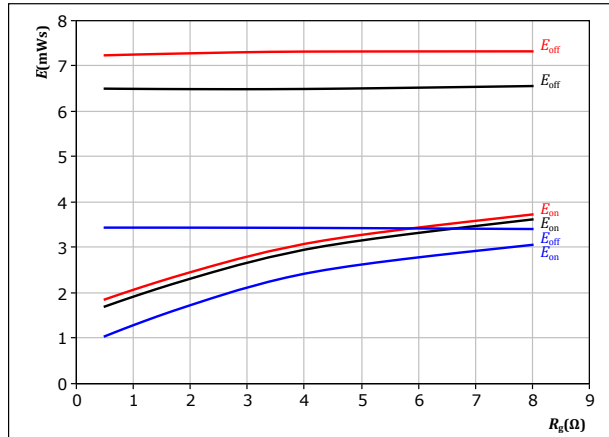
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \ \Omega$
 $R_{goff} = 2 \ \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 19. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$



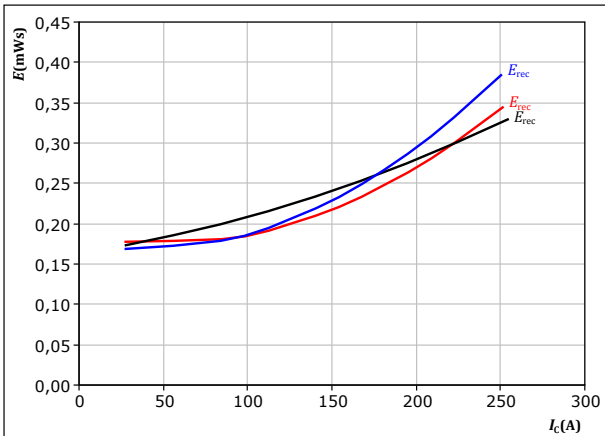
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 20. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$



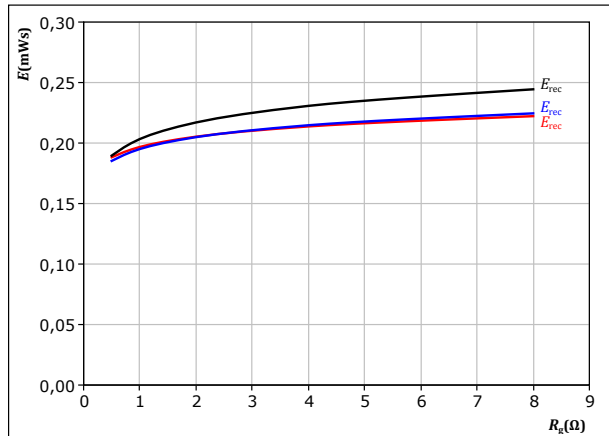
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \ \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 21. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

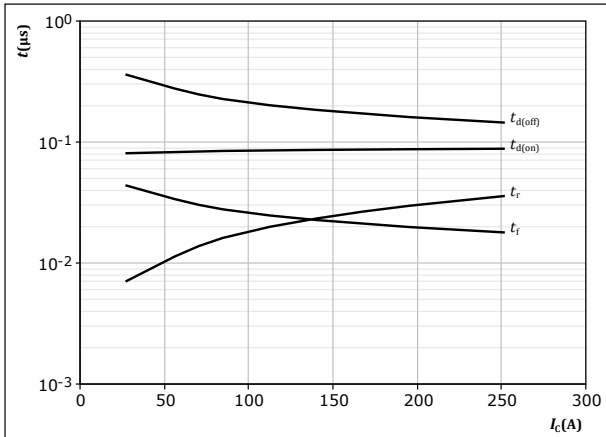
T_j : — 25 °C
 — 125 °C
 — 150 °C



NPC BUCK Switching Characteristics

figure 22. IGBT

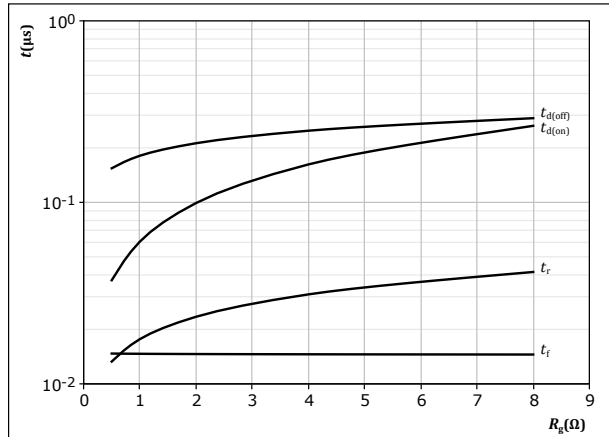
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$

figure 23. IGBT

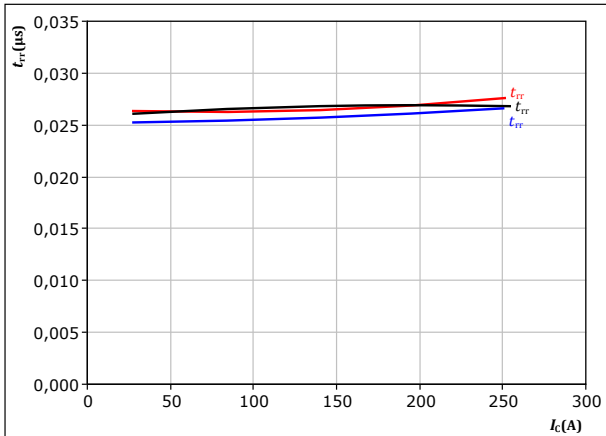
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

figure 24. FWD

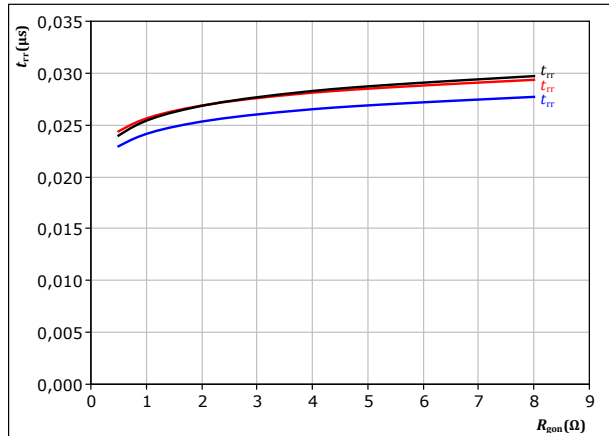
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$
 $T_j: \text{ } \text{---} 25 \text{ }^\circ\text{C}$
 $\text{---} 125 \text{ }^\circ\text{C}$
 $\text{---} 150 \text{ }^\circ\text{C}$

figure 25. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$
 $T_j: \text{ } \text{---} 25 \text{ }^\circ\text{C}$
 $\text{---} 125 \text{ }^\circ\text{C}$
 $\text{---} 150 \text{ }^\circ\text{C}$

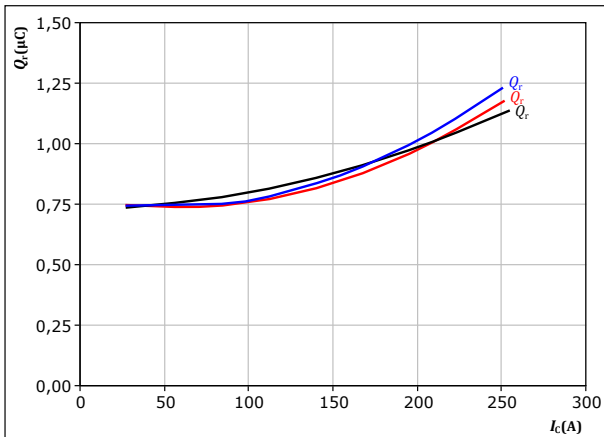


NPC BUCK Switching Characteristics

figure 26. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

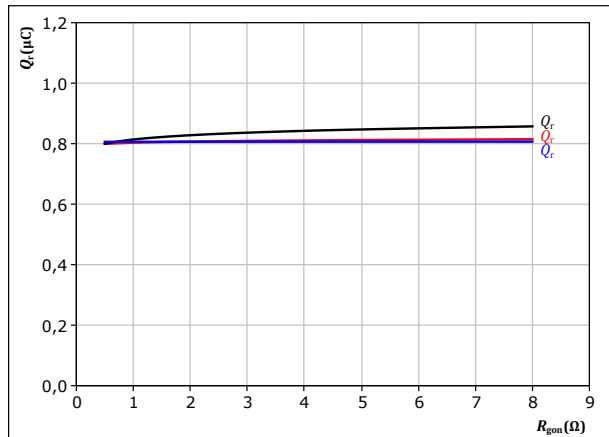
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \ \Omega$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 27. FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

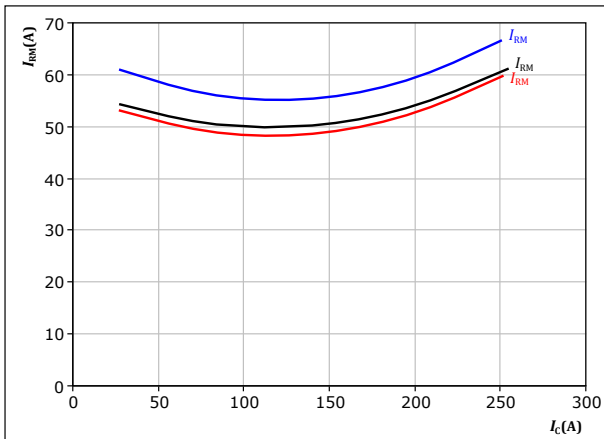
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 28. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

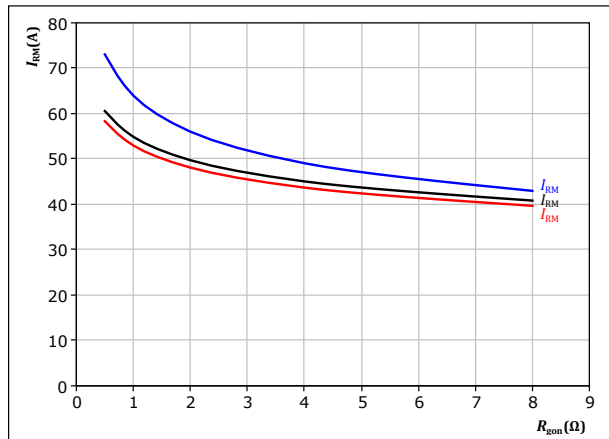
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \ \Omega$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 29. FWD

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

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



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

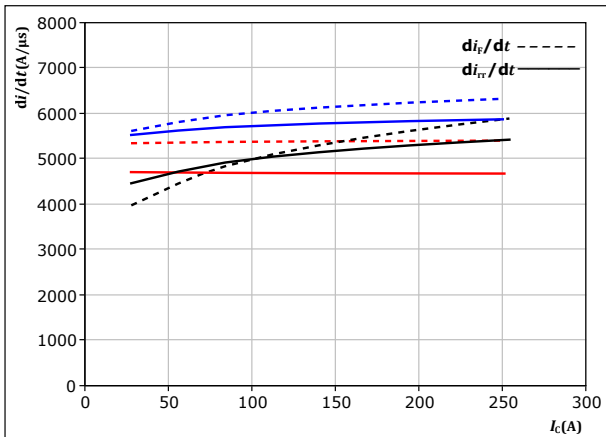
T_j : — 25 °C
— 125 °C
— 150 °C



NPC BUCK Switching Characteristics

figure 30. FWD

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

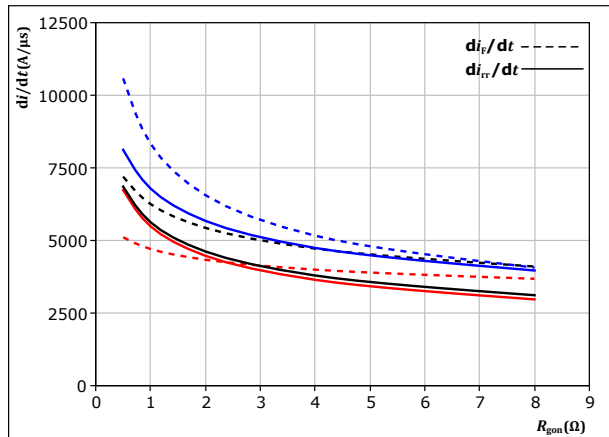


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

T_f :
— 25 °C
— 125 °C
— 150 °C

figure 31. FWD

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

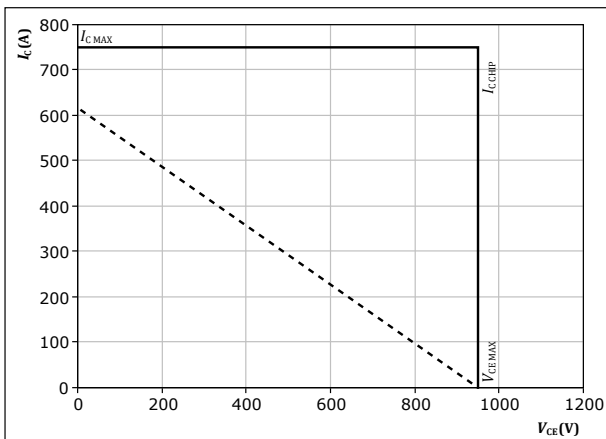


With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

T_f :
— 25 °C
— 125 °C
— 150 °C

figure 32. IGBT

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



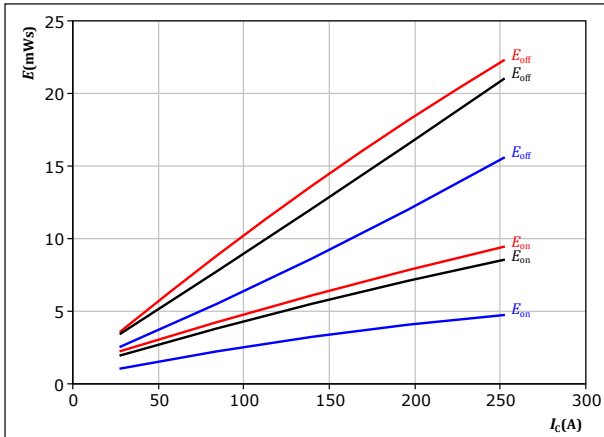
At $T_f = 150 \text{ } ^\circ\text{C}$
 $R_{gon} = 2 \text{ } \Omega$
 $R_{goff} = 2 \text{ } \Omega$



NPC BOOST Switching Characteristics

figure 33. IGBT

Typical switching energy losses as a function of collector current
 $E = f(I_c)$



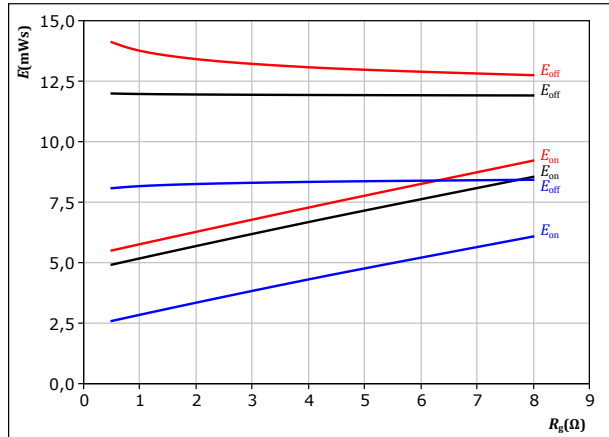
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{g\text{on}} = 2 \text{ } \Omega$
 $R_{g\text{off}} = 2 \text{ } \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 34. IGBT

Typical switching energy losses as a function of gate resistor
 $E = f(R_g)$



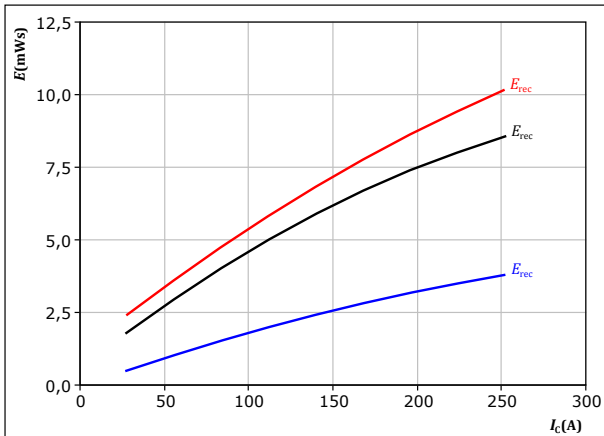
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 35. FWD

Typical reverse recovered energy loss as a function of collector current
 $E_{rec} = f(I_c)$



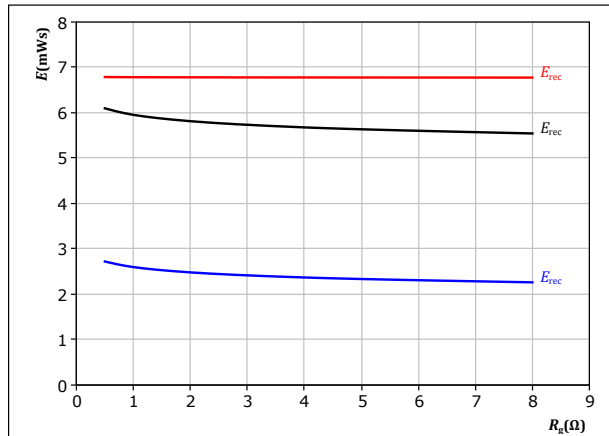
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{g\text{on}} = 2 \text{ } \Omega$

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 36. FWD

Typical reverse recovered energy loss as a function of gate resistor
 $E_{rec} = f(R_g)$



With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 140 \text{ A}$

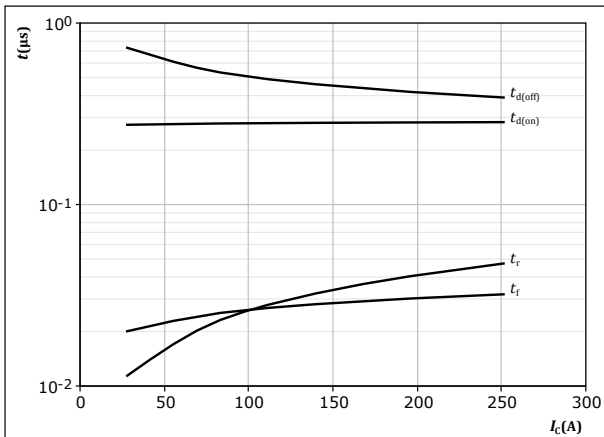
T_j : — 25 °C
 — 125 °C
 — 150 °C



NPC BOOST Switching Characteristics

figure 37. IGBT

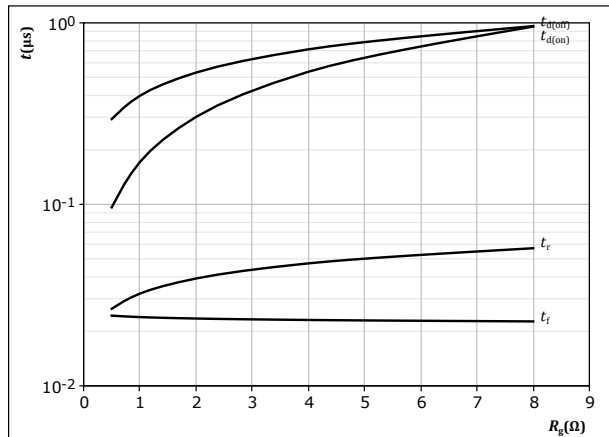
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

figure 38. IGBT

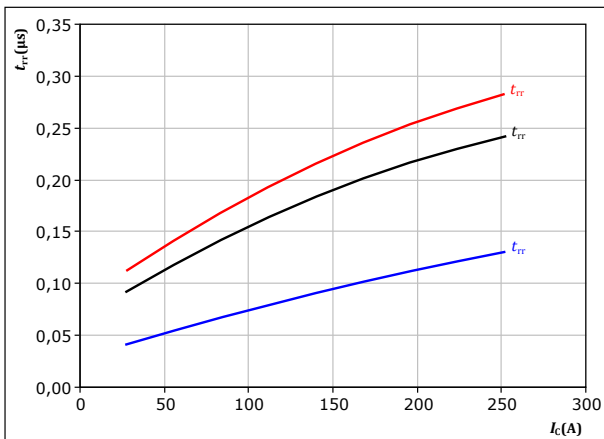
Typical switching times as a function of gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 140$ A

figure 39. FWD

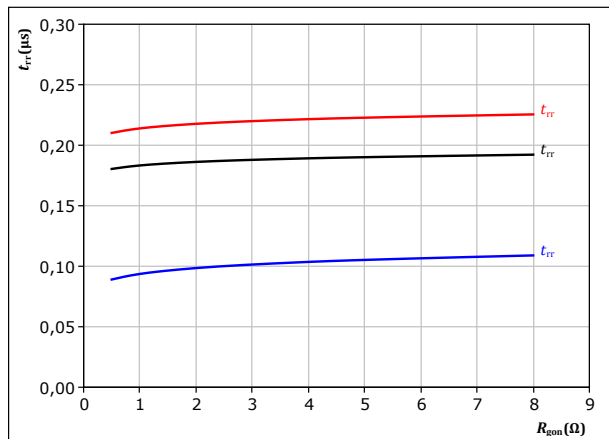
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 T_j : — 25 °C
— 125 °C
— 150 °C

figure 40. FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor
 $t_{rr} = f(R_{gon})$



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 140$ A
 T_j : — 25 °C
— 125 °C
— 150 °C

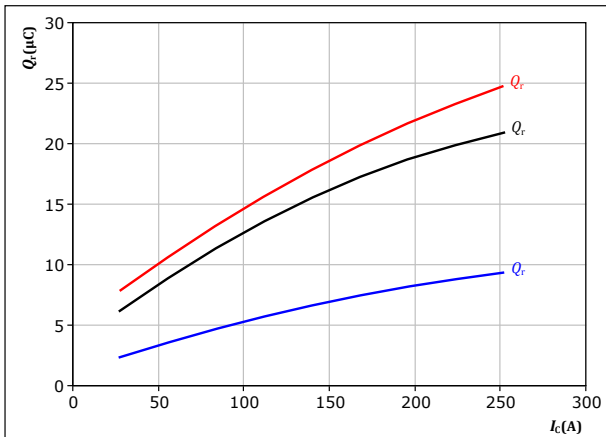


NPC BOOST Switching Characteristics

figure 41. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

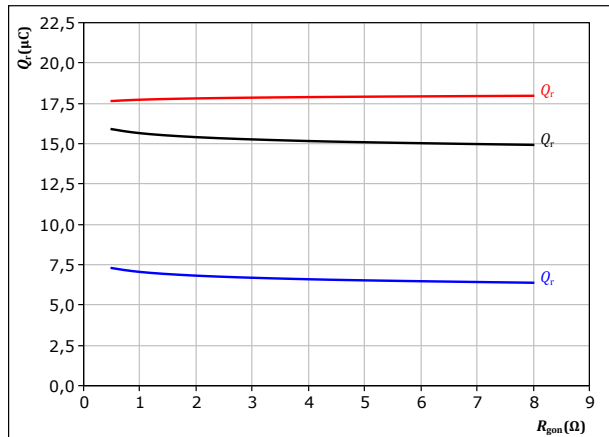
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

T_j : — 25 °C
— 125 °C
— 150 °C

figure 42. FWD

Typical recovered charge as a function of turn on gate resistor

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



With an inductive load at

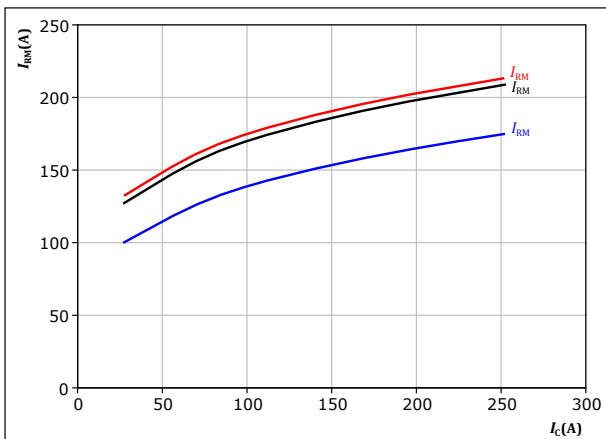
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 140$ A

T_j : — 25 °C
— 125 °C
— 150 °C

figure 43. FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

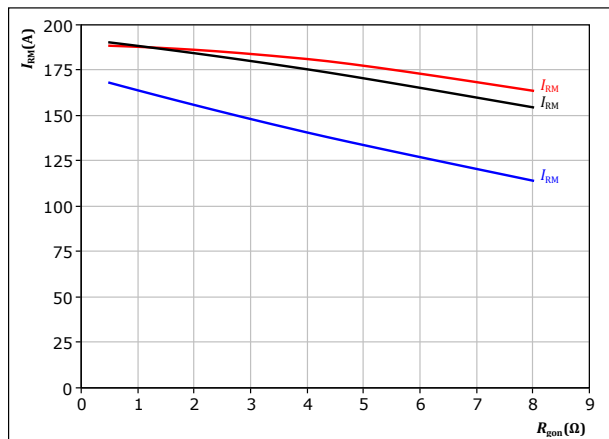
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

T_j : — 25 °C
— 125 °C
— 150 °C

figure 44. FWD

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

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



With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 140$ A

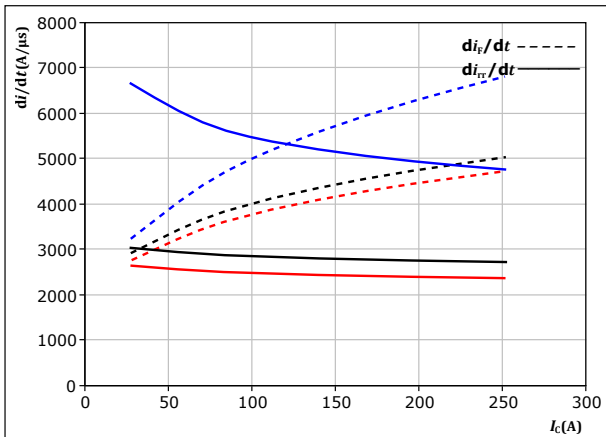
T_j : — 25 °C
— 125 °C
— 150 °C



NPC BOOST Switching Characteristics

figure 45. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_i/dt, di_r/dt = f(I_c)$

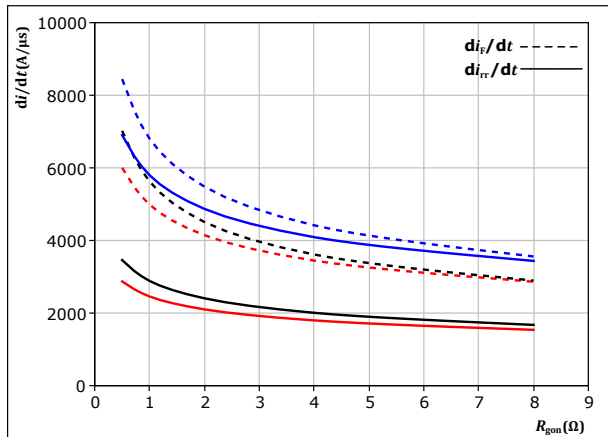


With an inductive load at

$V_{CE} =$	600 V	$T_j =$	25 °C
$V_{GE} =$	±15 V		125 °C
$R_{gon} =$	2 Ω		150 °C

figure 46. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
 $di_i/dt, di_r/dt = f(R_{gon})$

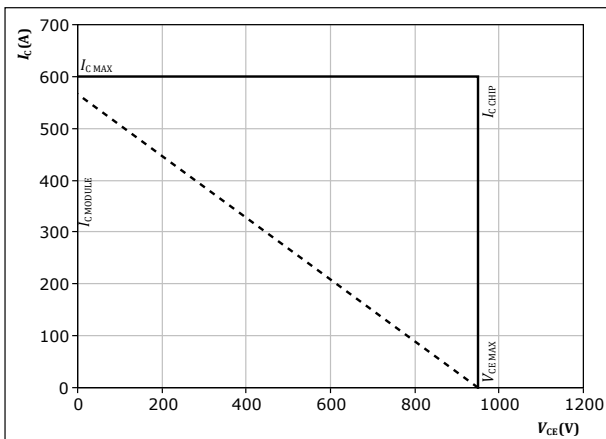


With an inductive load at

$V_{CE} =$	600 V	$T_j =$	25 °C
$V_{GE} =$	±15 V		125 °C
$I_c =$	140 A		150 °C

figure 47. IGBT

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



At $T_j =$ 150 °C
 $R_{gon} =$ 2 Ω
 $R_{goff} =$ 2 Ω



Switching Definitions

figure 48. IGBT
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})

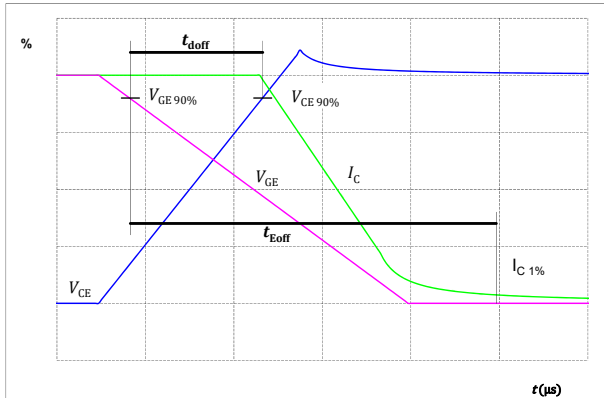


figure 49. IGBT
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})

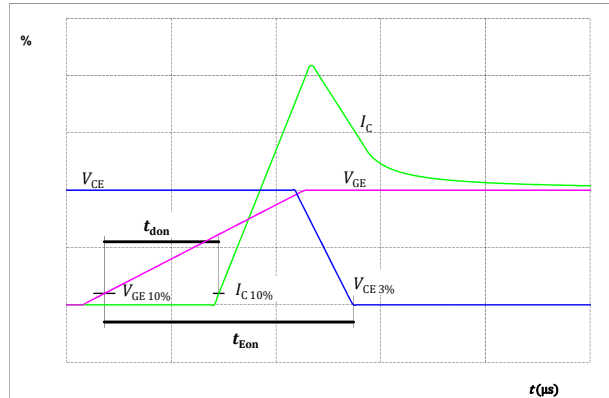


figure 50. IGBT
Turn-off Switching Waveforms & definition of t_f

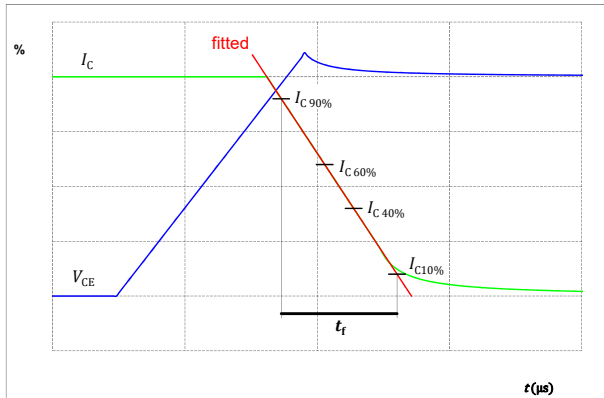
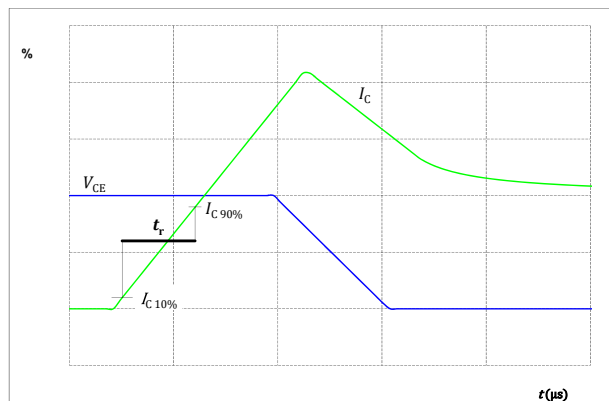


figure 51. IGBT
Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 52. FWD

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

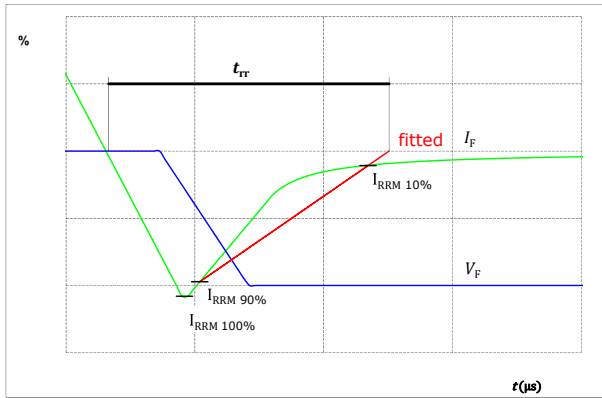
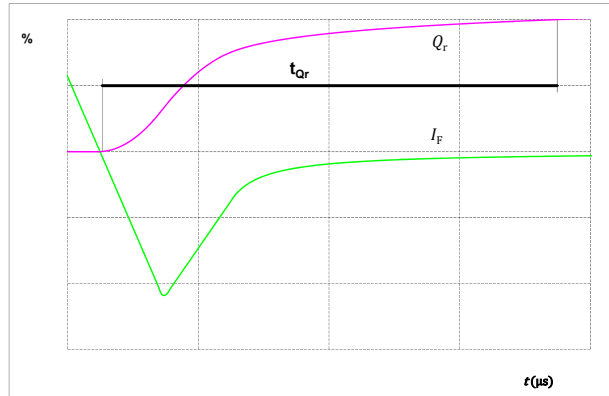


figure 53. FWD

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





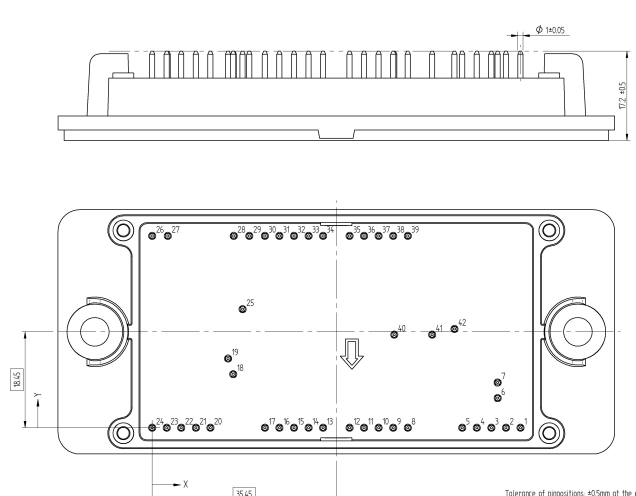
Vincotech

30-FT10NIA375F9-LQ08F08
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	30-FT10NIA375F9-LQ08F08
With thermal paste	30-FT10NIA375F9-LQ08F08-/3/

Marking						
	Text	Name NN-NNNNNNNNNNNNNN- TTTTTVV	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS
	Datamatrix	Type&Ver TTTTTTVV	Lot number LLLLL	Serial SSSS	Date code WWYY	

Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	70,9	0	DC-	
2	68,1	0	DC-	
3	65,3	0	DC-	
4	62,5	0	DC-	
5	59,7	0	DC-	
6	66,5	5,7	S12	
7	66,5	8,7	G12	
8	49,2	0	GND1	
9	46,4	0	GND1	
10	43,6	0	GND1	
11	40,8	0	GND1	
12	38	0	GND1	
13	32,9	0	GND2	
14	30,1	0	GND2	
15	27,3	0	GND2	
16	24,5	0	GND2	
17	21,7	0	GND2	
18	15,6	10,3	S11	
19	14,6	13,3	G11	
20	11,2	0	DC+	
21	8,4	0	DC+	
22	5,6	0	DC+	
23	2,8	0	DC+	
24	0	0	DC+	
25	17,4	22,8	P	
26	0	36,9	Therm1	
27	3	36,9	Therm2	
28	15,7	36,9	G13	
29	18,7	36,9	S13	
30	21,7	36,9	Ph2	
31	24,5	36,9	Ph2	
32	27,3	36,9	Ph2	
33	30,1	36,9	Ph2	
34	32,9	36,9	Ph2	
35	38	36,9	Ph1	
36	40,8	36,9	Ph1	
37	43,6	36,9	Ph1	
38	46,4	36,9	Ph1	
39	49,2	36,9	Ph1	
40	46,6	17,9	G14	
41	53,9	17,9	S14	
42	58,2	19	N	

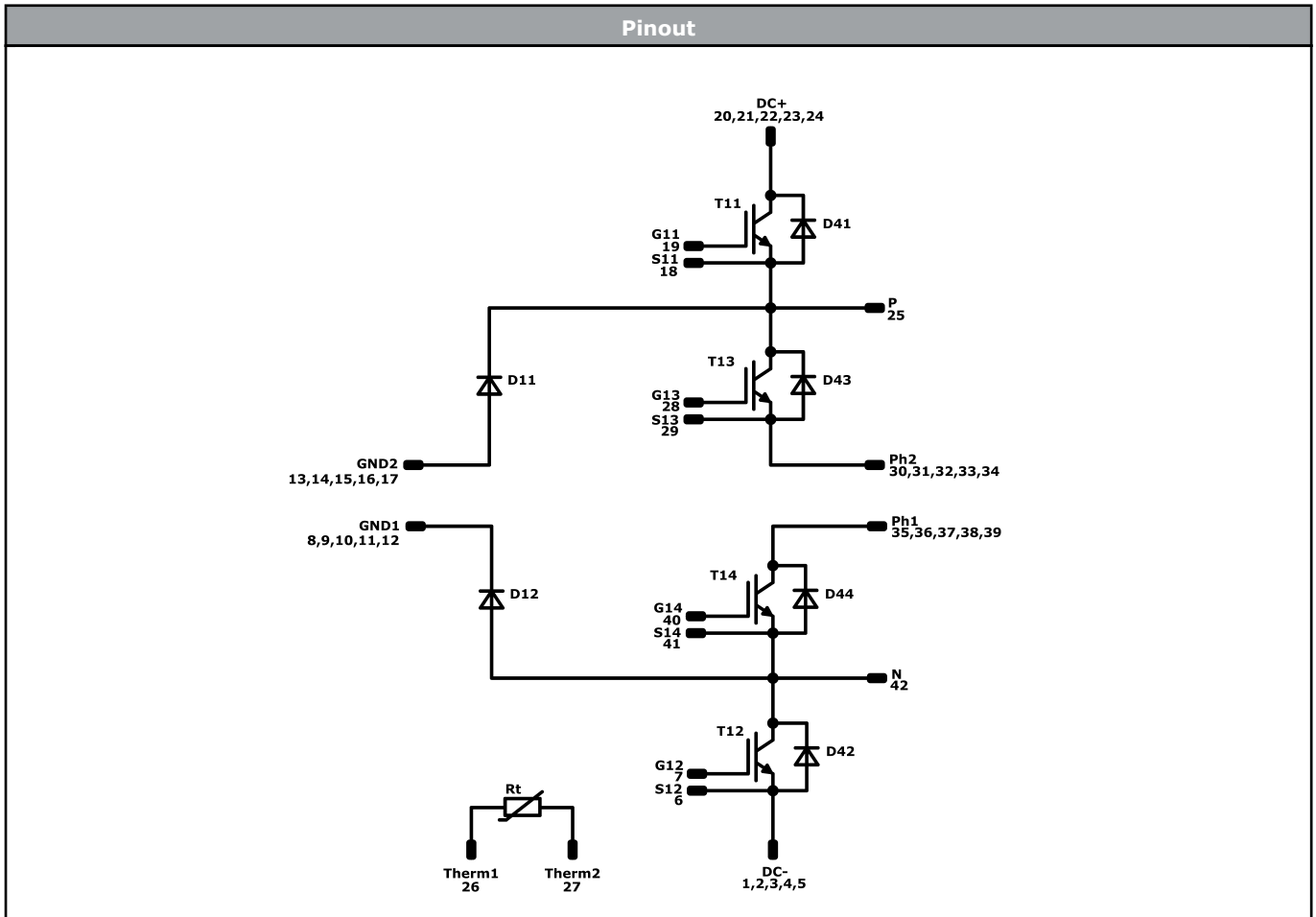


Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech

30-FT10NIA375F9-LQ08F08
datasheet




Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	950 V	375 A	NPC BUCK Switch	
D11, D12	FWD	1200 V	100 A	NPC BUCK Diode	
T13, T14	IGBT	950 V	300 A	NPC BOOST Switch	
D41, D42	FWD	950 V	150 A	NPC BOOST Diode	
D43, D44	FWD	950 V	150 A	Boost Sw. Inv. Diode	
Rt	NTC			Thermistor	



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-FT10NIA375F9-LQ08F08-D1-14	6 Mar. 2020		

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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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