Vincotech

B0-SL10NIB600S702-PA29F78Z
B0-SL10NIC600S702-PA39F78Z
datasheet

***flow*NPC S3 split** **950 V / 600 A**

Topology features

- Kelvin Emitter for improved switching performance
- Temperature sensor
- Neutral Point Clamped Topology (I-Type)
- Split topology

Component features

- Low collector emitter saturation voltage
- High speed and smooth switching

Housing features

- Base isolation: AlN
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

- Solar Inverters

Types

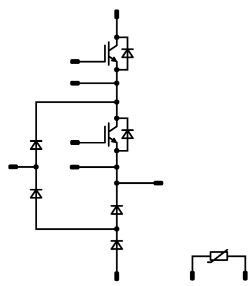
- B0-SL10NIB600S702-PA29F78Z
- B0-SL10NIC600S702-PA39F78Z

flow S3 12 mm housing

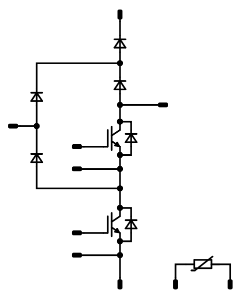
PA29F78Z

PA39F78Z

Schematic



PA29F78Z



PA39F78Z

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Buck Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	444	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	864	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	171	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		488	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	1040	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	432	W
Maximum junction temperature	T_{jmax}			175	°C
Buck Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	77	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	160	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	528	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	981	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}			175	°C
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	209	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	413	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Inv. Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	220	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	390	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	40	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	170	A
Surge current capability	I^2t			145	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	113	W
Maximum junction temperature	T_{jmax}			175	°C
Boost D. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	77	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	160	W
Maximum junction temperature	T_{jmax}			175	°C

Module Properties

Parameter	Symbol	Conditions		Value	Unit
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 s	6000	V
Creepage distance		B0-SL10NIB600S702-PA29F78Z		>12,7	mm
		B0-SL10NIC600S702-PA39F78Z		9,93	
Clearance		B0-SL10NIB600S702-PA29F78Z		11,58	mm
		B0-SL10NIC600S702-PA39F78Z		8,06	
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

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	
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE}			0,00975	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	V_{CEsat}		15		600	25 125 150		1,82 2,07 2,13	2,25(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			12	μA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Internal gate resistance	r_g							0,5		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		37800		pF
Output capacitance	C_{oes}							810		pF
Reverse transfer capacitance	C_{res}							120		pF
Gate charge	Q_g		±15		0	25		1350		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,11		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 4 Ω	±15	600	355	25 125 150		211,78 215,26 216,47		ns
Rise time	t_r					25 125 150		34,5 37,3 37,75		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		270,24 311,24 321,97		ns
Fall time	t_f					25 125 150		29,46 45,96 56,5		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,835 μC Q_{rFWD}=0,851 μC Q_{rFWD}=0,855 μC				25 125 150		9,16 10,02 9,98		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		11,55 17,35 19,23		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	
Buck Diode										
Static										
Forward voltage	V_F				160	25 125 150		1,72 2,17 2,32	1,8[(1)]	V
Reverse leakage current	I_R	V_r = 1200 V				25		280	1600	µA
Thermal										
Thermal resistance junction to sink [(2)]	$R_{th(j\text{-}s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,22		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=9122 A/µs d*i*/d*t*=6238 A/µs d*i*/d*t*=6469 A/µs	±15	600	355	25 125 150		61,78 62,06 62,93		A
Reverse recovery time	t_{rr}					25 125 150		22,52 22,77 23,05		ns
Recovered charge	Q_r					25 125 150		0,835 0,851 0,855		µC
Reverse recovered energy	E_{rec}					25 125 150		0,26 0,263 0,266		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		6756,77 7049,49 6408,11		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	
Buck Sw. Protection Diode										
Static										
Forward voltage	V_F				100	25 125 150	2,1	2,64 2,44 2,36	2,8[1]	V
Reverse leakage current	I_R	V_r = 950 V				25			4	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,59		K/W

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,06	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		600	25 125 150		1,69 1,88 1,93	1,85(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			300	µA
Gate-emitter leakage current	I_{GES}		20	0		25			1500	nA
Internal gate resistance	r_g							0,667		Ω
Input capacitance	C_{ies}		0	10		25		111000		pF
Output capacitance	C_{oes}		0	10		25		3300		pF
Reverse transfer capacitance	C_{res}		0	10		25		1260		pF
Gate charge	Q_g	V_{CC} = 600 V	15		600	25		3600		nC
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,1		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	600	25 125 150		579,15 583,32 587		ns
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	600	25 125 150		159,66 178,99 185,61		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	600	25 125 150		356,71 389,7 401,8		ns
Fall time	t_f	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	600	25 125 150		76,99 97,68 103,24		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=5 µC Q_{rFWD}=14,99 µC Q_{rFWD}=18,2 µC	±15	600	600	25 125 150		69,98 89,22 95,96		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	600	25 125 150		39,36 49,08 51,32		mWs

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	
Boost Diode										
Static										
Forward voltage	V_F				300	25 125 150	2,1	2,59 2,43 2,37	2,8(1)	V
Reverse leakage current	I_R	V_r = 950 V				25			12	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,23		K/W
Dynamic										
Peak recovery current	I_{RRM}	d*i*/d*t*=2823 A/µs d*i*/d*t*=2590 A/µs d*i*/d*t*=2276 A/µs	±15	600	600	25 125 150		65,6 113,82 120,13		A
Reverse recovery time	t_{rr}					25 125 150		169,26 278,24 317,94		ns
Recovered charge	Q_r					25 125 150		5 14,99 18,2		µC
Reverse recovered energy	E_{rec}					25 125 150		1,12 3,78 4,67		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		722,67 604,7 472,81		A/µs

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	
Boost Sw. Inv. Diode										
Static										
Forward voltage	V_F				225	25 125 150	1,45	1,9 1,83 1,8	1,95(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			2,28	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,24		K/W
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				35	25 125 150		2,53 2,67 2,58	2,62(1) 2,62(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 2700	60 5500	µA
Thermal										
Thermal resistance junction to sink (2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,84		K/W

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	
Boost D. Protection Diode										
Static										
Forward voltage	V_F				100	25 125 150	2,1	2,64 2,44 2,36	2,8[1]	V
Reverse leakage current	I_R	V_r = 950 V				25			4	μA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j\text{-}s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,59		K/W
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					25		130		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	

(1) Value at chip level

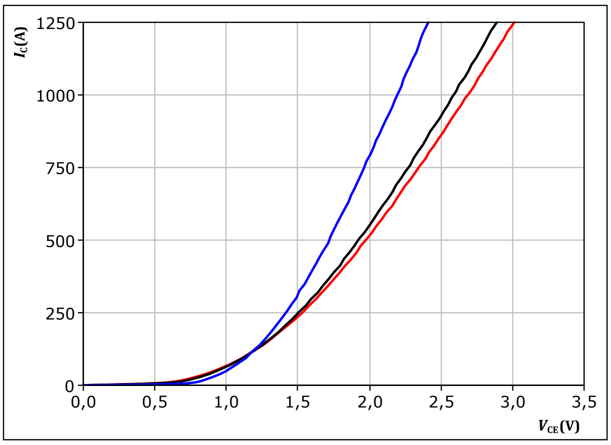
(2) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

I_C = f(V_{CE})

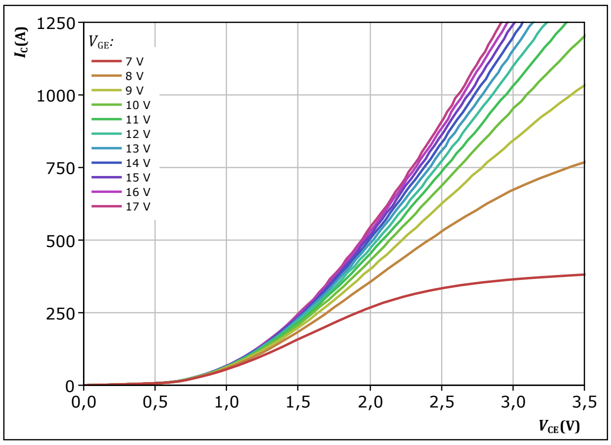


t_p =	250	µs			25 °C
V_{GE} =	15	V	T_j:		125 °C
					150 °C

figure 2. IGBT

Typical output characteristics

I_C = f(V_{CE})



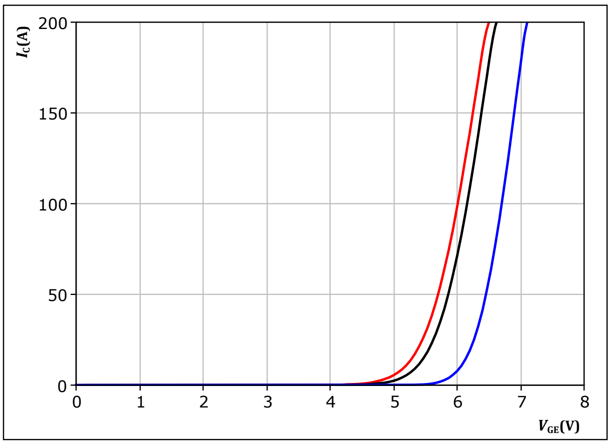
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

I_C = f(V_{GE})

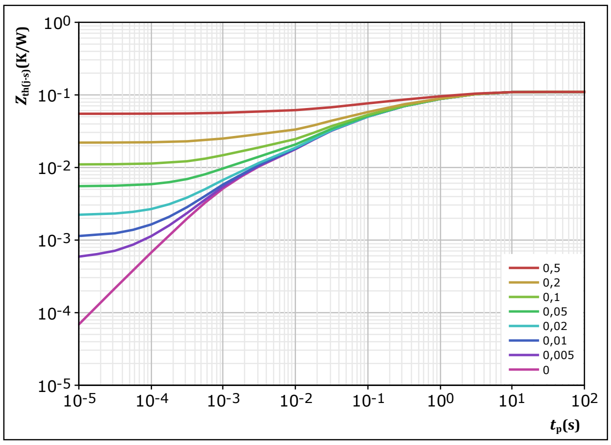


t_p =	250	µs			25 °C
V_{CE} =	24	V	T_j:		125 °C
					150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,11	K/W

IGBT thermal model values

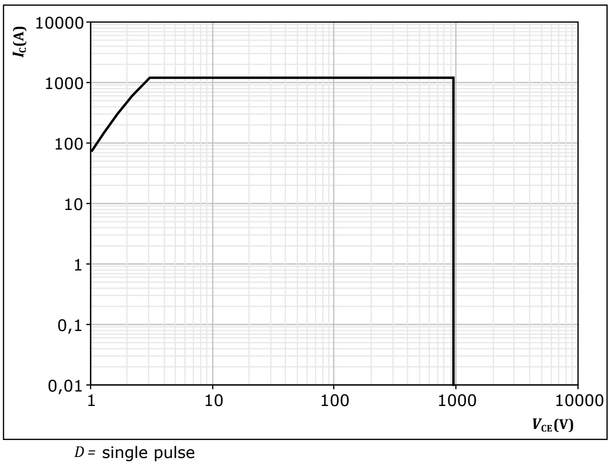
R (K/W)	τ (s)
1,72E-02	3,12E+00
2,61E-02	9,92E-01
3,34E-02	1,78E-01
2,60E-02	2,52E-02
7,27E-03	1,28E-03

Buck Switch Characteristics

figure 5.	IGBT

Safe operating area

I_C = f(V_{CE})



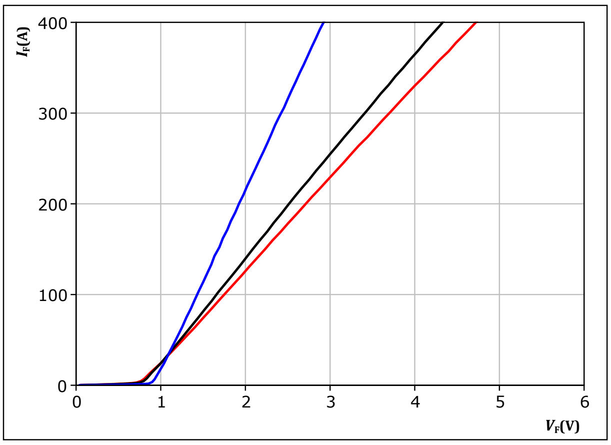
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



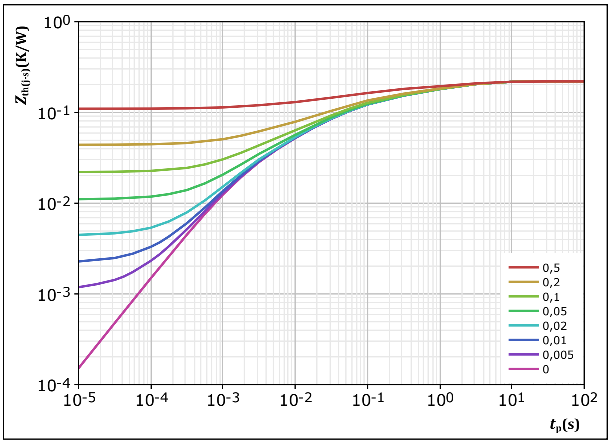
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,22 K/W

FWD thermal model values

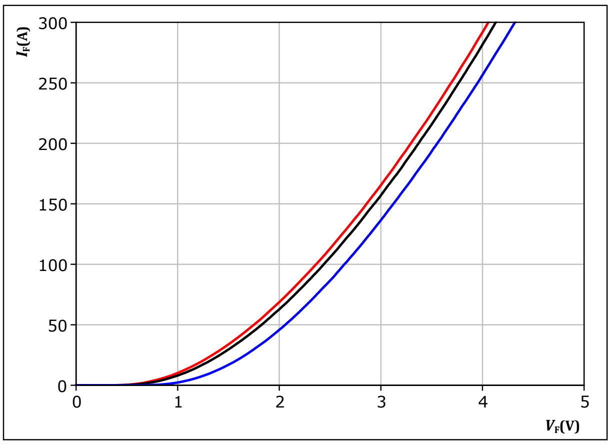
R (K/W)	τ (s)
3,69E-02	3,31E+00
5,12E-02	6,84E-01
7,45E-02	6,90E-02
3,95E-02	1,11E-02
1,79E-02	1,70E-03

Buck Sw. Protection Diode Characteristics

figure 8. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



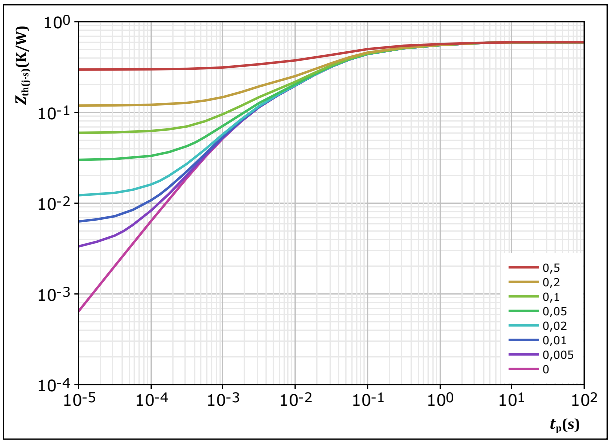
$t_p =$ 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 9. **FWD**

Transient thermal impedance as a function of pulse width

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



$D =$ t_p / T

$R_{th(j\text{-}s)} =$ 0,594 K/W

FWD thermal model values

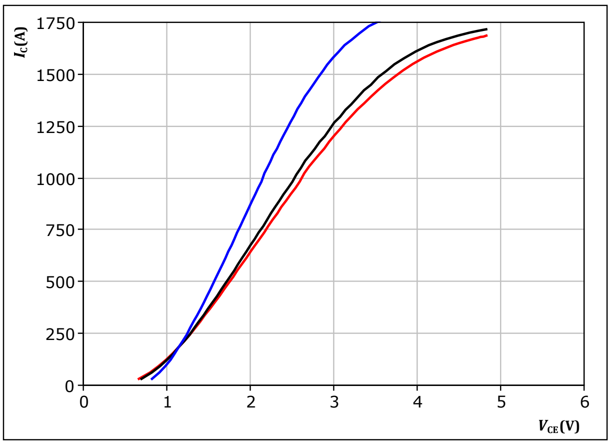
R (K/W)	τ (s)
5,02E-02	2,46E+00
7,95E-02	4,43E-01
2,28E-01	5,90E-02
1,50E-01	1,50E-02
8,75E-02	1,73E-03

Boost Switch Characteristics

figure 10. IGBT

Typical output characteristics

$I_C = f(V_{CE})$



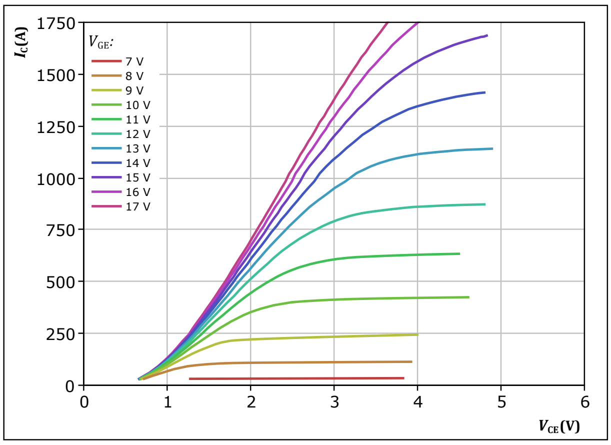
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 11. IGBT

Typical output characteristics

$I_C = f(V_{CE})$



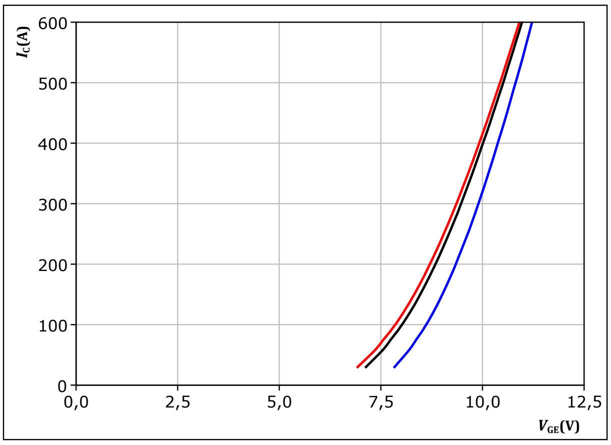
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 12. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



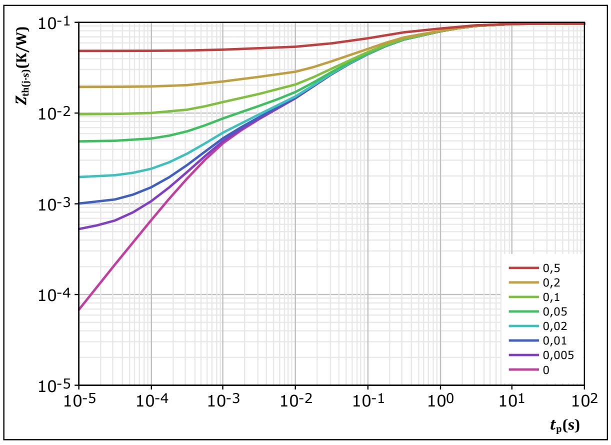
t_p =	250	µs
V_{CE} =	10	V

T_j: 25 °C, 125 °C, 150 °C

figure 13. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j\text{-}s)}$ =	0,097	K/W

IGBT thermal model values

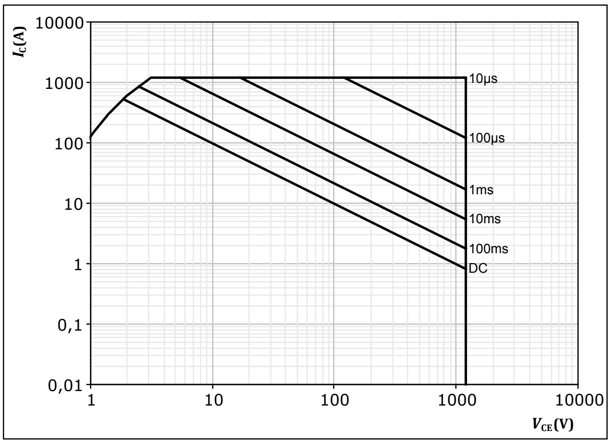
R (K/W)	τ (s)
1,01E-02	3,90E+00
2,69E-02	9,57E-01
3,87E-02	1,31E-01
1,54E-02	2,17E-02
5,74E-03	9,87E-04

Boost Switch Characteristics

figure 14. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



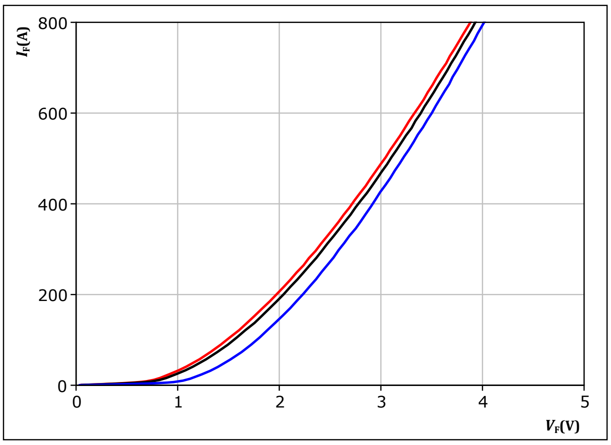
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

I_F = f(V_F)



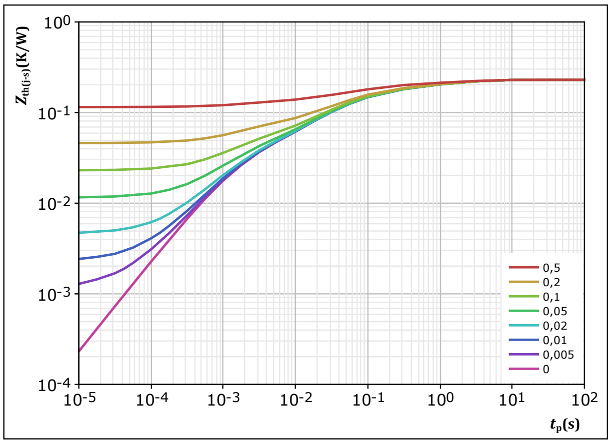
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,23 K/W

FWD thermal model values

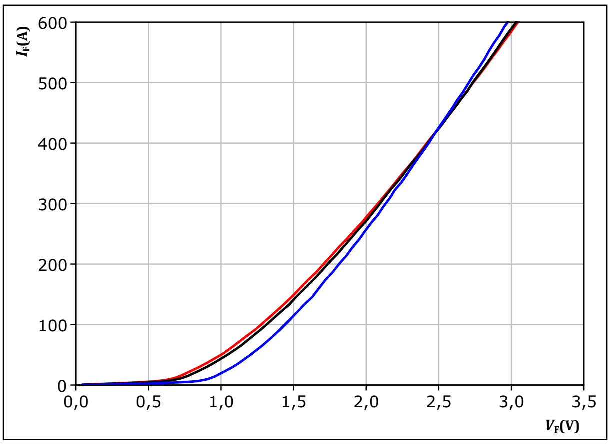
R (K/W)	τ (s)
2,56E-02	2,90E+00
4,35E-02	5,53E-01
9,09E-02	6,81E-02
4,34E-02	1,43E-02
2,66E-02	1,41E-03

Boost Sw. Inv. Diode Characteristics

figure 17. **FWD**

Typical forward characteristics

I_F = f(V_F)



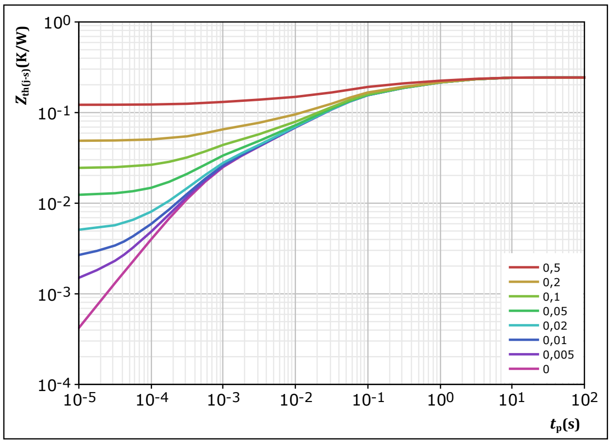
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 18. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,244 K/W

FWD thermal model values

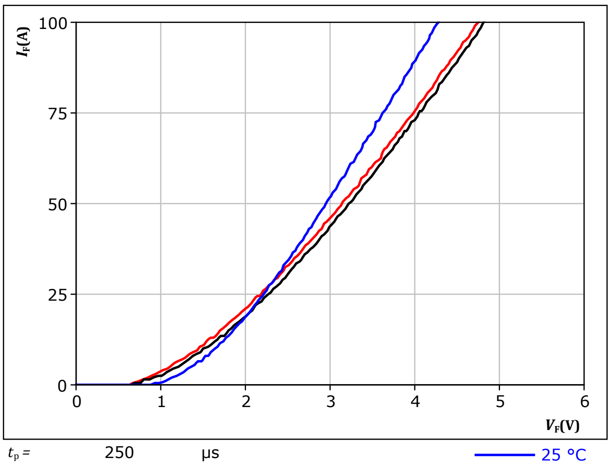
R (K/W)	τ (s)
3,51E-02	2,48E+00
5,14E-02	4,38E-01
9,82E-02	5,01E-02
3,42E-02	7,68E-03
2,47E-02	6,90E-04

Boost Sw. Protection Diode Characteristics

figure 19. **FWD**

Typical forward characteristics

I_F = f(V_F)

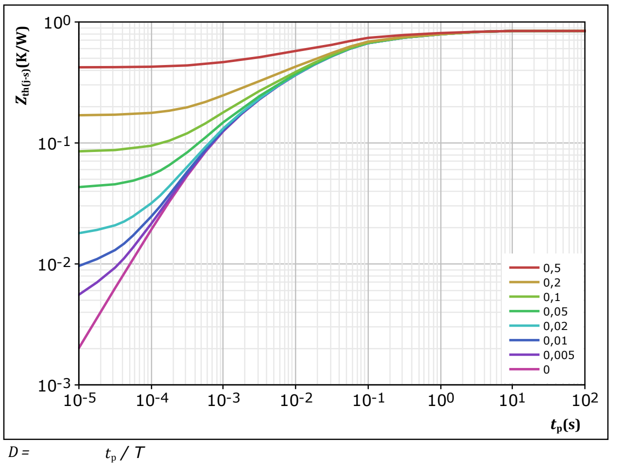


t_p =	250	µs	
		T_j:	25 °C
			125 °C
			150 °C

figure 20. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,843 K/W

FWD thermal model values

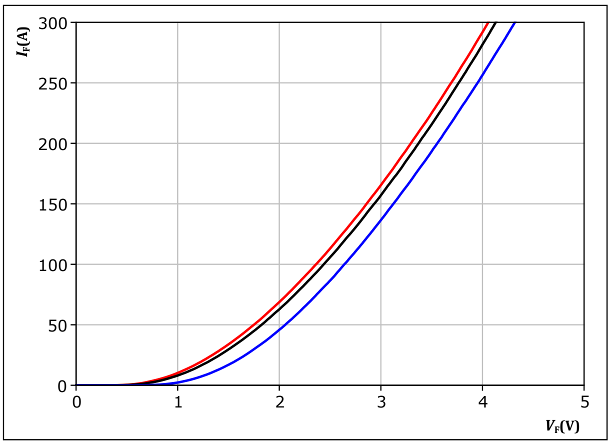
R (K/W)	τ (s)
9,03E-02	1,79E+00
1,29E-01	1,94E-01
3,56E-01	2,98E-02
1,83E-01	3,56E-03
8,48E-02	6,09E-04

Boost D. Protection Diode Characteristics

figure 21. FWD

Typical forward characteristics

I_F = f(V_F)



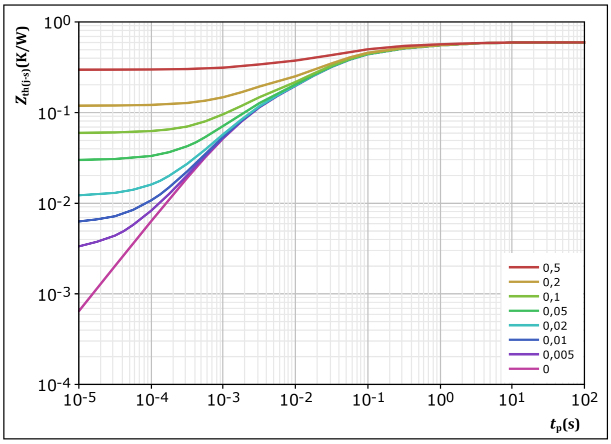
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 22. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,594 K/W

FWD thermal model values

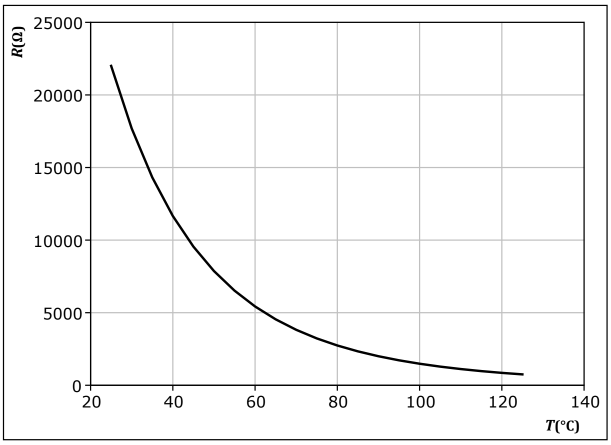
R (K/W)	τ (s)
5,02E-02	2,46E+00
7,95E-02	4,43E-01
2,28E-01	5,90E-02
1,50E-01	1,50E-02
8,75E-02	1,73E-03

Thermistor Characteristics

figure 23.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

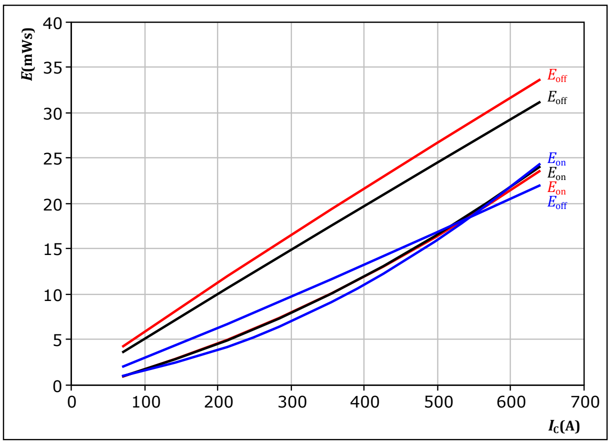


Buck Switching Characteristics

figure 25. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



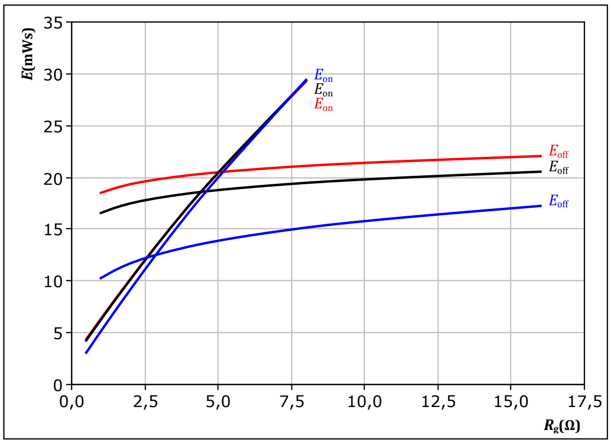
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	4	Ω		

figure 26. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$



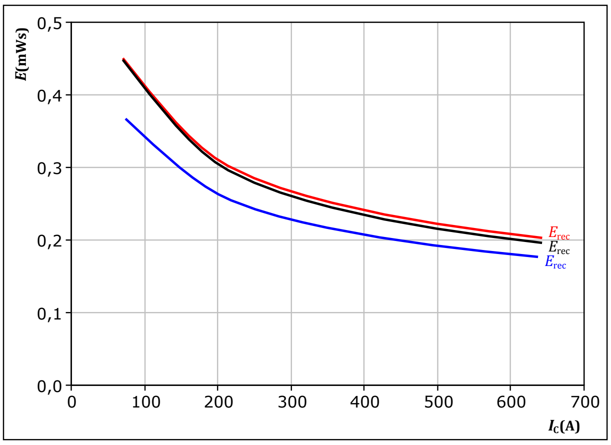
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	355	A		150 °C

figure 27. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



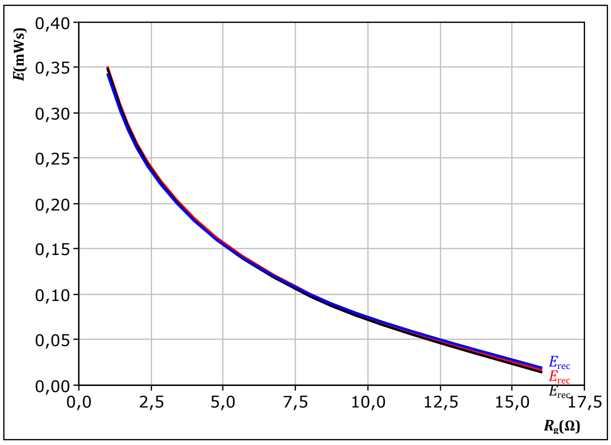
With an inductive load at

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

figure 28. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

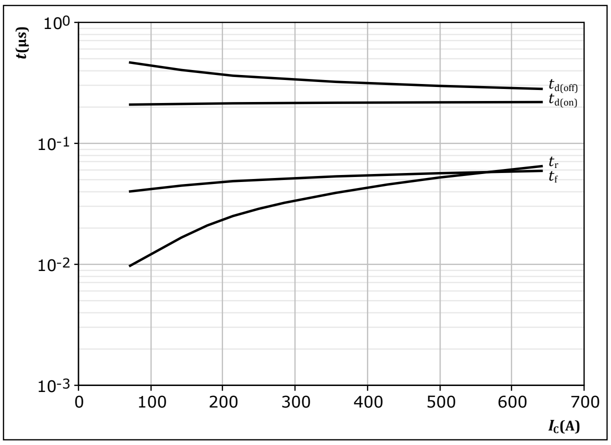
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	355	A		150 °C

Buck Switching Characteristics

figure 29. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



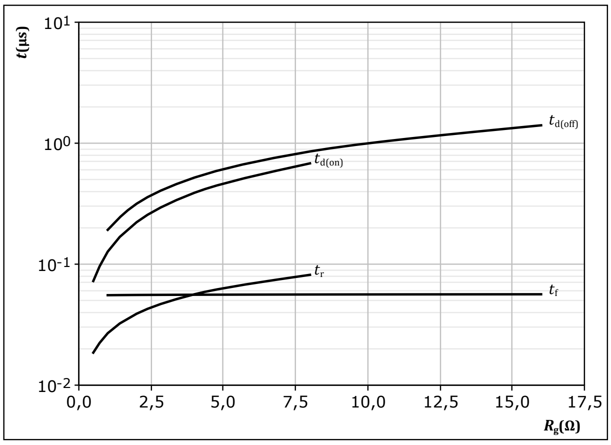
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	4	Ω

figure 30. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



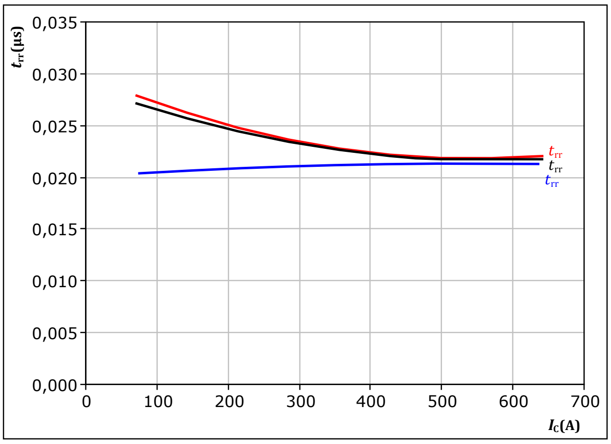
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	355	A

figure 31. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

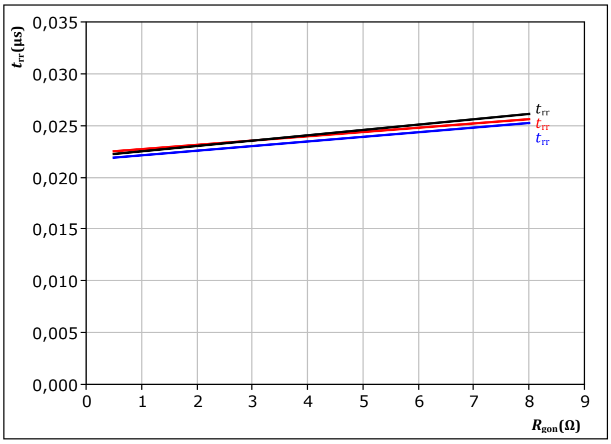
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 32. **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} =	±15	V
I_C =	355	A

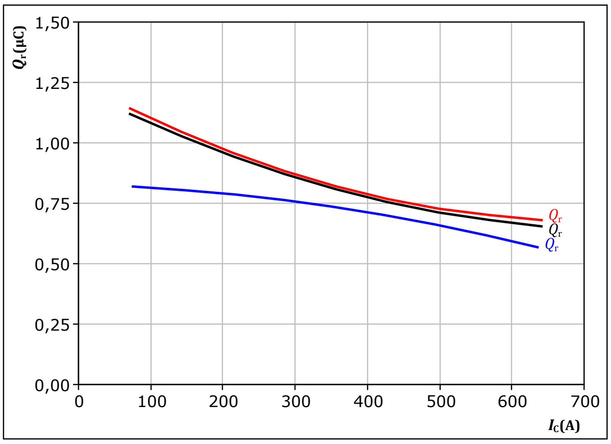
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 33. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



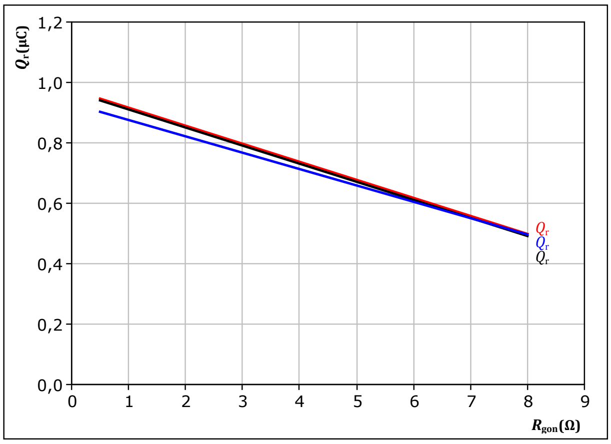
With an inductive load at

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

figure 34. **FWD**

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

Q_r = f(R_{gon})



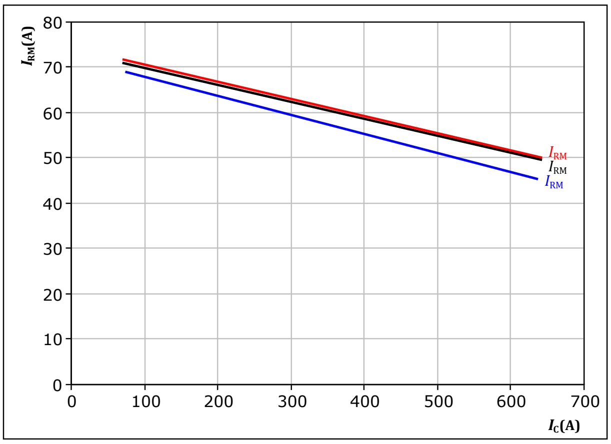
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	355	A		150 °C

figure 35. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



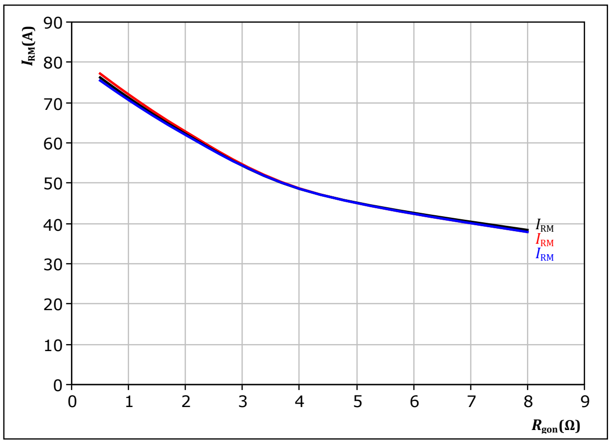
With an inductive load at

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

figure 36. **FWD**

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

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



With an inductive load at

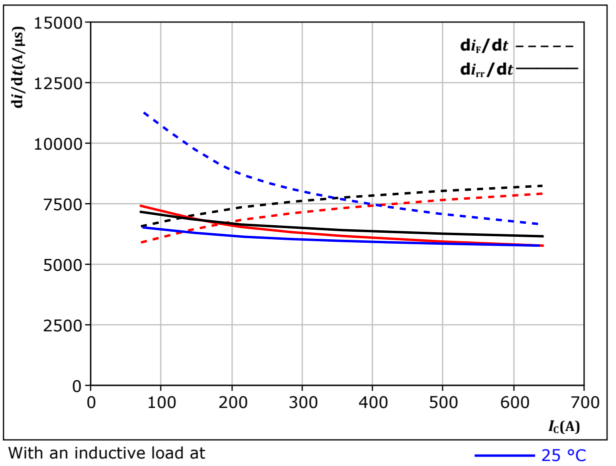
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	355	A		150 °C

Buck Switching Characteristics

figure 37. **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)



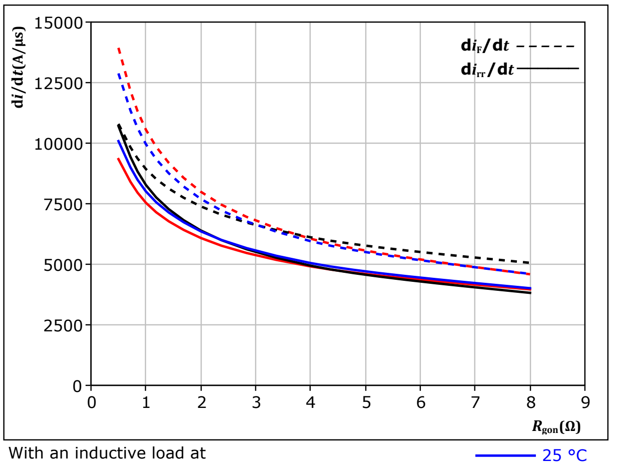
With an inductive load at

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

figure 38. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})



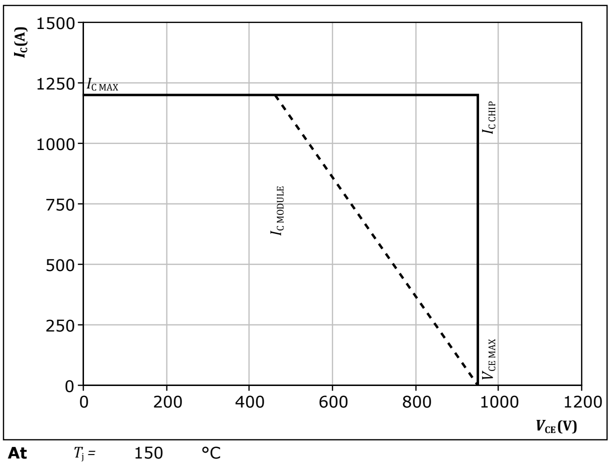
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	355	A		150 °C

figure 39. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	4	Ω

Vincotech

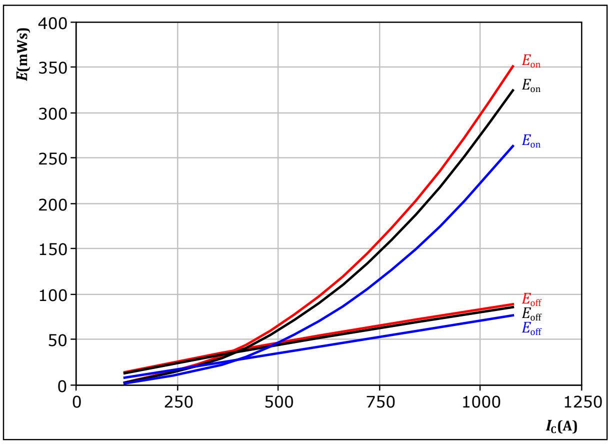
B0-SL10NIB600S702-PA29F78Z
B0-SL10NIC600S702-PA39F78Z
datasheet

Boost Switching Characteristics

figure 39. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



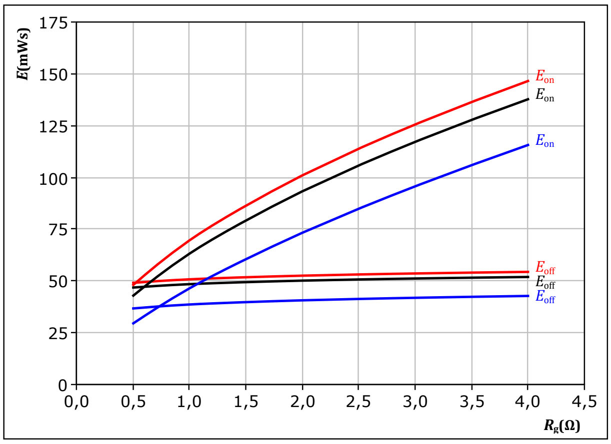
With an inductive load at

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

figure 40. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



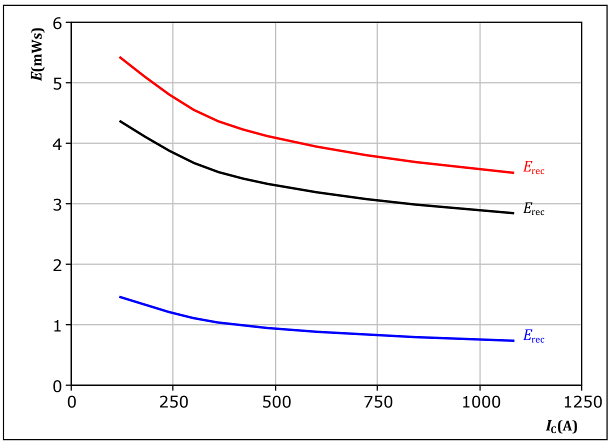
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	600	A	

figure 41. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



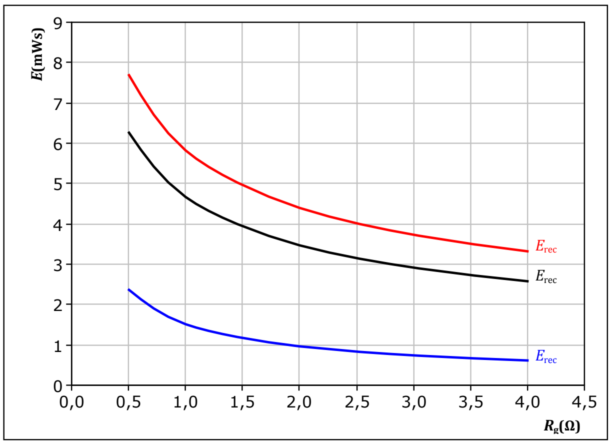
With an inductive load at

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

figure 42. **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	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	600	A	

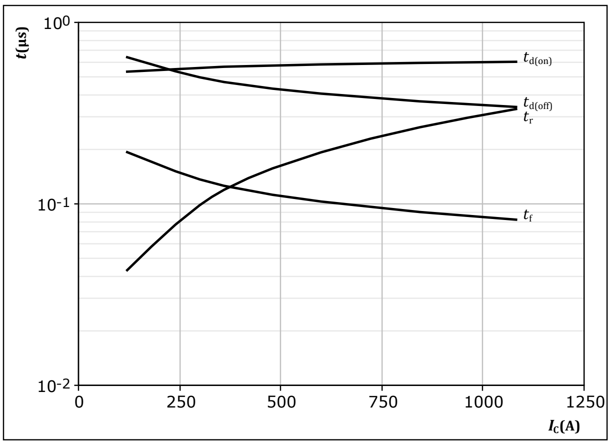
B0-SL10NIB600S702-PA29F78Z
B0-SL10NIC600S702-PA39F78Z
datasheet

Boost Switching Characteristics

figure 43. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



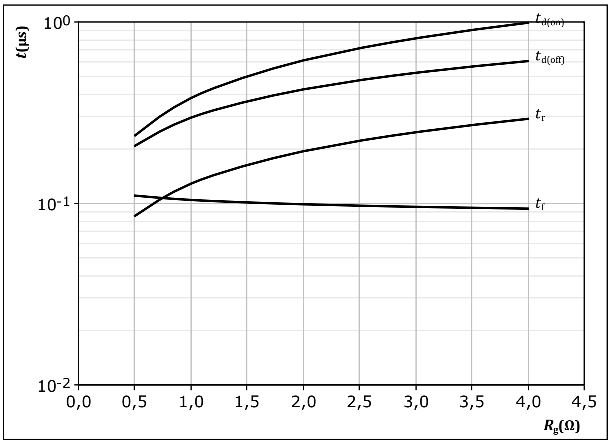
With an inductive load at

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

figure 44. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



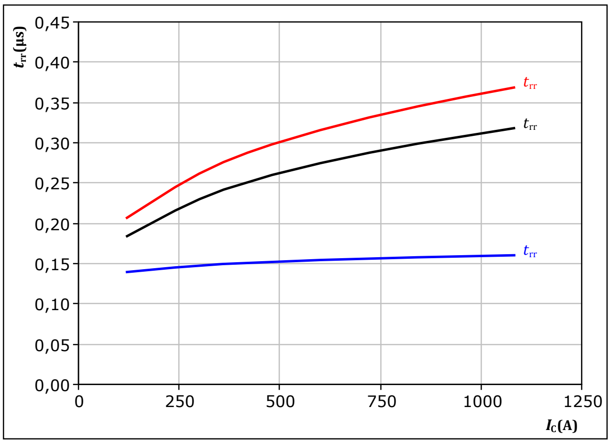
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	600	A

figure 45. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

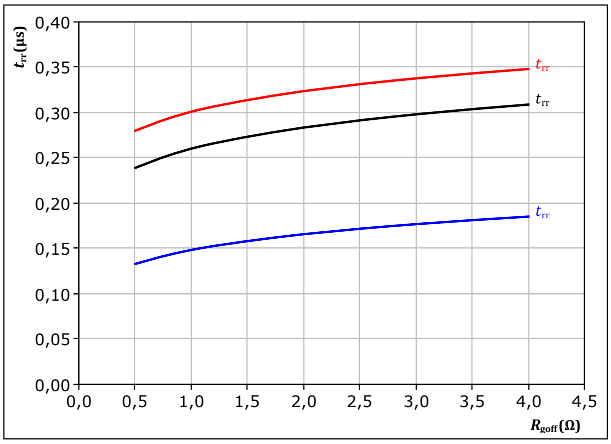
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 46. **FWD**

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

$t_{rr} = f(R_{goff})$



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	600	A

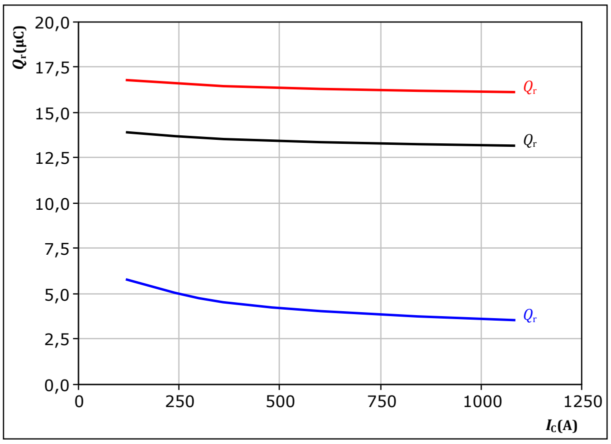
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 47. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



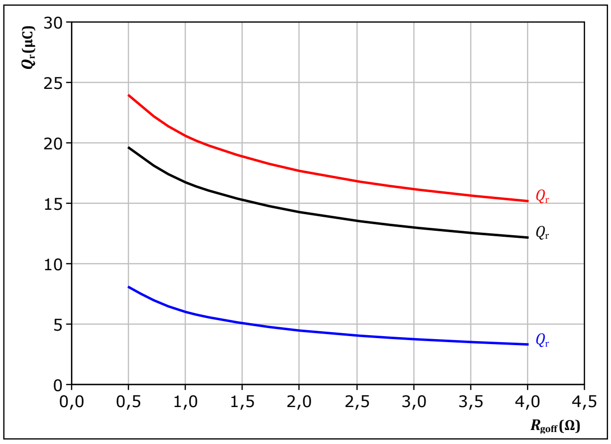
With an inductive load at

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

figure 48. **FWD**

Typical recovered charge as a function of turn off gate resistor

$Q_r = f(R_{goff})$



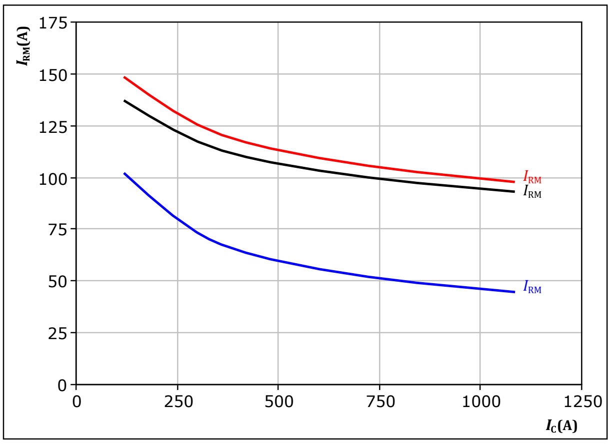
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	600	A		150 °C

figure 49. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



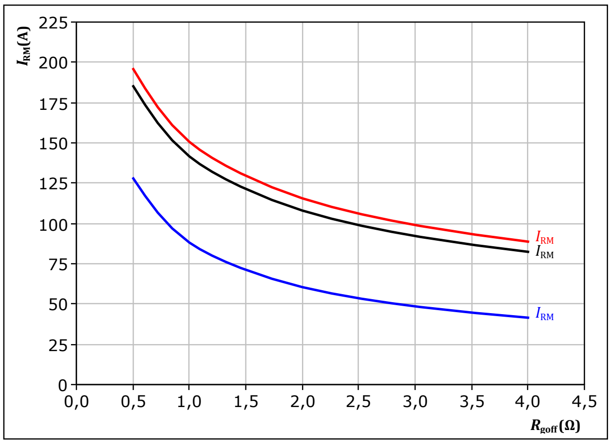
With an inductive load at

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

figure 50. **FWD**

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

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



With an inductive load at

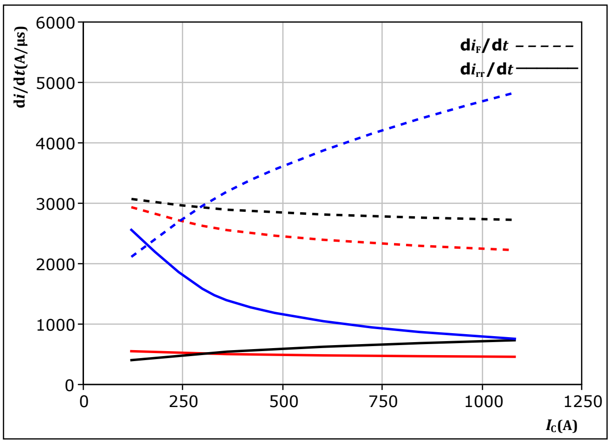
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	600	A		150 °C

Boost Switching Characteristics

figure 51. **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

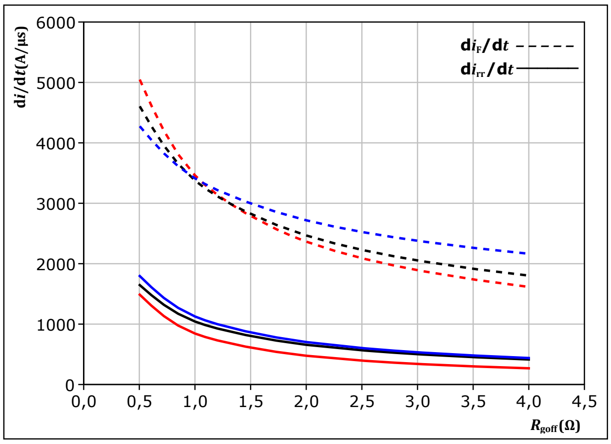
V_{CE} =	600	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 52. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor

di_F/dt, di_{rr}/dt = f(R_{goff})



With an inductive load at

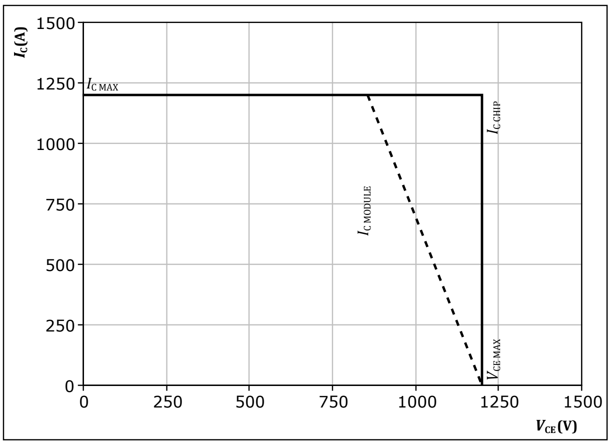
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	600	A

T_j: 25 °C, 125 °C, 150 °C

figure 53. **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 54. **IGBT**

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

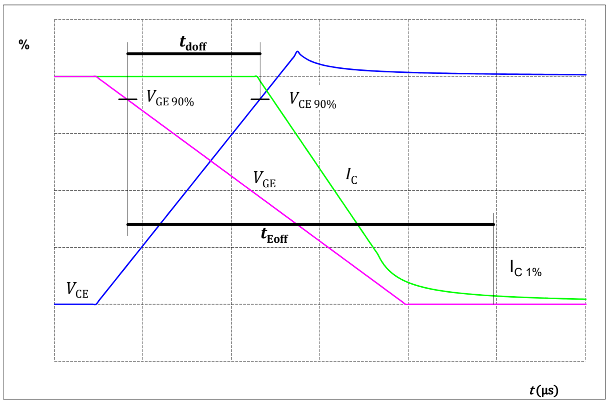


figure 55. **IGBT**

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

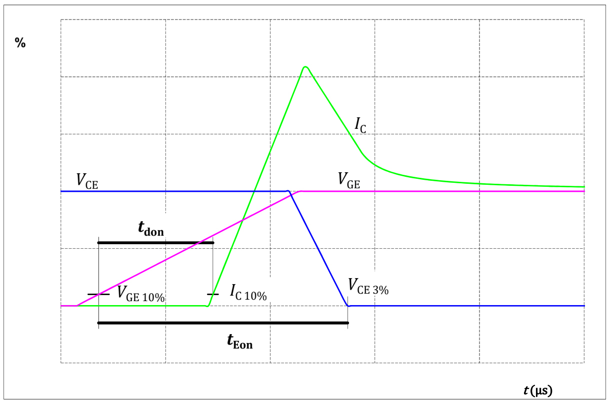


figure 56. **IGBT**

Turn-off Switching Waveforms & definition of t_f

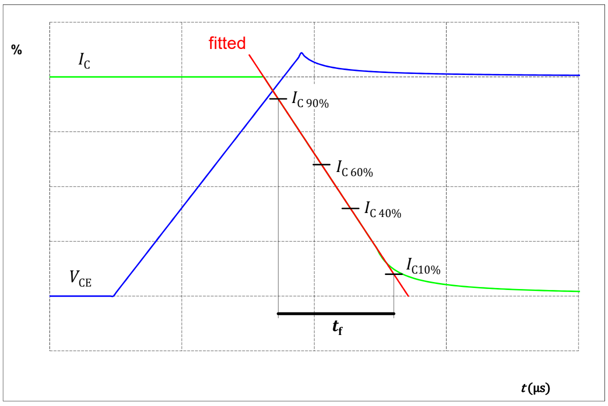
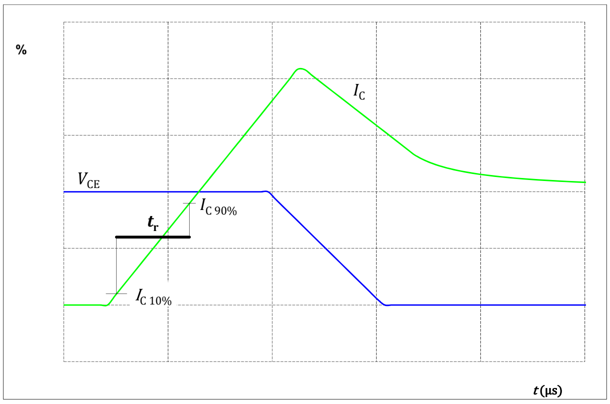


figure 57. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 58. **FWD**

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

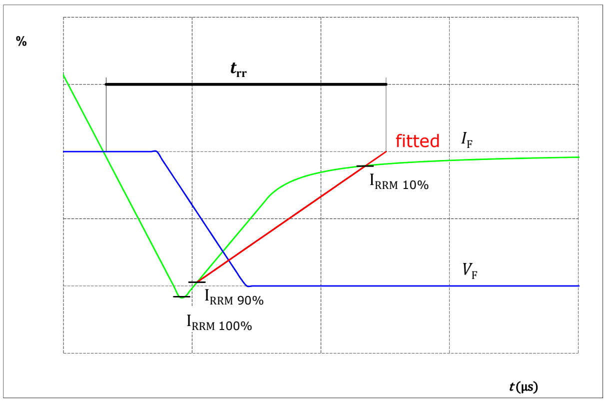
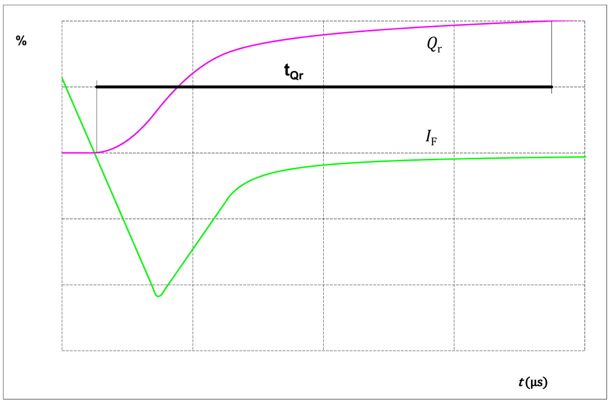


figure 59. **FWD**

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



Ordering Code

Version	Ordering Code
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SL10NIB600S702-PA29F78Z-/7/

Marking

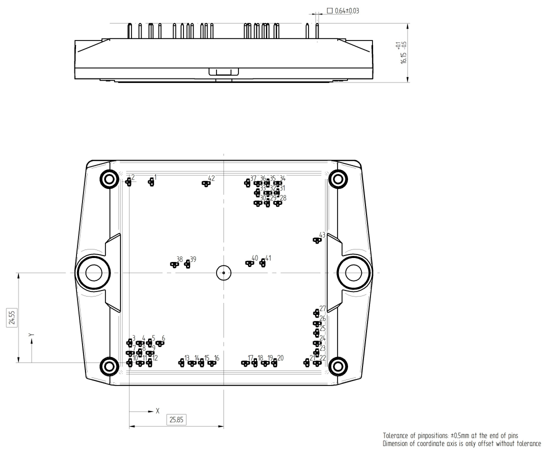
		Name		Date code	UL & VIN	Lot	Serial
	Text	NN-NNNNNNNNNNNNNN-TTTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

High Side Module B0-SL10NIB600S702-PA29F78Z

Outline

Pin table [mm]

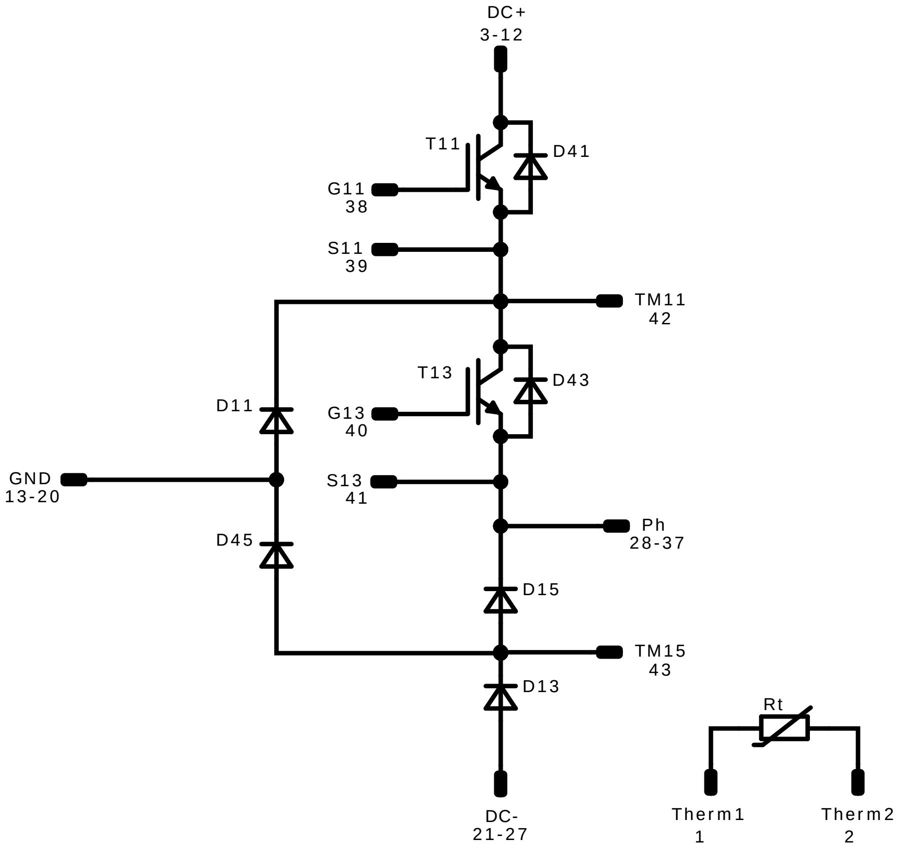
Pin	X	Y	Function
1	6,2	49,4	Therm1
2	0	49,4	Therm2
3	0,3	5,4	DC+
4	3	5,4	DC+
5	5,7	5,4	DC+
6	8,4	5,4	DC+
7	0,3	2,7	DC+
8	3	2,7	DC+
9	5,7	2,7	DC+
10	0,3	0	DC+
11	3	0	DC+
12	5,7	0	DC+
13	14,5	0	GND
14	17,2	0	GND
15	19,9	0	GND
16	22,6	0	GND
17	31,8	0	GND
18	34,5	0	GND
19	37,2	0	GND
20	39,9	0	GND
21	48,7	0	DC-
22	51,4	0	DC-
23	51,4	2,7	DC-
24	51,4	5,4	DC-
25	51,4	8,1	DC-
26	51,4	10,8	DC-
27	51,4	13,5	DC-
28	40,6	43,7	Ph
29	37,9	43,7	Ph
30	35,2	43,7	Ph
31	40,6	46,4	Ph
32	37,9	46,4	Ph
33	35,2	46,4	Ph
34	40,6	49,1	Ph
35	37,9	49,1	Ph
36	35,2	49,1	Ph
37	32,5	49,1	Ph
38	12,4	26,95	G11
39	16,1	26,95	S11
40	32,95	27,3	G13
41	36,65	27,3	S13
42	21,05	49,1	TM11
43	51,4	33,6	TM15



Vincotech

High Side Module B0-SL10NIB600S702-PA29F78Z

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11	IGBT	950 V	600 A	Buck Switch	
D11	FWD	1200 V	160 A	Buck Diode	
D41	FWD	950 V	100 A	Buck Sw. Protection Diode	
T13	IGBT	1200 V	600 A	Boost Switch	
D13	FWD	950 V	300 A	Boost Diode	
D15	FWD	1200 V	225 A	Boost Sw. Inv. Diode	
D43	FWD	1200 V	35 A	Boost Sw. Protection Diode	
D45	FWD	950 V	100 A	Boost D. Protection Diode	
Rt	Thermistor			Thermistor	

Ordering Code	
Version	**Ordering Code**
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SL10NIC600S702-PA39F78Z-/7/

Marking

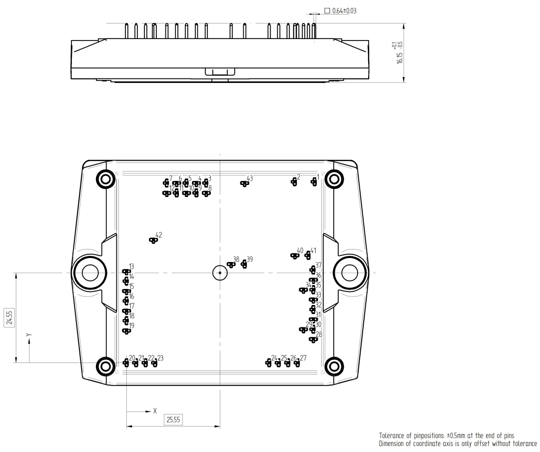
	**Text**	**Name**		**Date code**	**UL & VIN**	**Lot**	**Serial**
		NN-NNNNNNNNNNNNNN-TTTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

Low Side Module B0-SL10NIC600S702-PA39F78Z

Outline

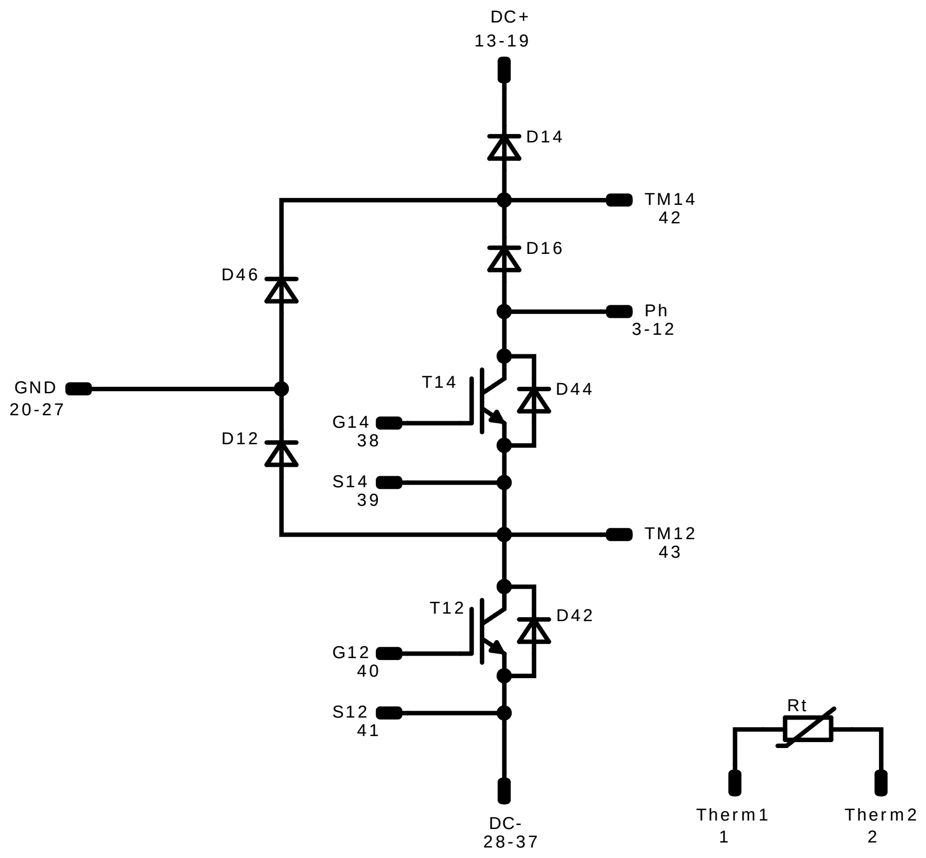
Pin table [mm]

Pin	X	Y	Function
1	51,45	49,45	Therm1
2	46	49,45	Therm2
3	21,8	49,1	Ph
4	19,1	49,1	Ph
5	16,4	49,1	Ph
6	13,7	49,1	Ph
7	11	49,1	Ph
8	21,8	46,4	Ph
9	19,1	46,4	Ph
10	16,4	46,4	Ph
11	13,7	46,4	Ph
12	11	46,4	Ph
13	0	25	DC+
14	0	22,3	DC+
15	0	19,6	DC+
16	0	16,9	DC+
17	0	14,2	DC+
18	0	11,5	DC+
19	0	8,8	DC+
20	0	0	GND
21	2,6	0	GND
22	5,2	0	GND
23	7,8	0	GND
24	39	0	GND
25	41,6	0	GND
26	44,2	0	GND
27	46,8	0	GND
28	51,1	6,45	DC-
29	48,4	9,15	DC-
30	51,1	9,15	DC-
31	51,1	11,85	DC-
32	51,1	14,55	DC-
33	51,1	17,25	DC-
34	48,4	19,95	DC-
35	51,1	19,95	DC-
36	51,1	22,65	DC-
37	51,1	25,35	DC-
38	28,6	26,95	G14
39	32,3	26,95	S14
40	46,05	29,35	G12
41	49,75	29,35	S12
42	7,35	33,6	TM14
43	32,3	49,1	TM12



Low Side Module B0-SL10NIC600S702-PA39F78Z

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T12	IGBT	950 V	600 A	Buck Switch	
D12	FWD	1200 V	160 A	Buck Diode	
D42	FWD	950 V	100 A	Buck Sw. Protection Diode	
T14	IGBT	1200 V	600 A	Boost Switch	
D14	FWD	950 V	300 A	Boost Diode	
D16	FWD	1200 V	225 A	Boost Sw. Inv. Diode	
D44	FWD	1200 V	35 A	Boost Sw. Protection Diode	
D46	FWD	950 V	100 A	Boost D. Protection Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* S3 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at 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
B0-SL10NIx600S702-PAx9F78Z-D1-14	23 Jul. 2021		
B0-SL10NIx600S702-PAx9F78Z-D2-14	16 Jan. 2022	Dynamic measurements without connection of P/N	
B0-SL10NIx600S702-PAx9F78Z-D3-14	8 May. 2022	Buck dynamic with asymmetric Rg	