



flowNPC 1

600 V / 100 A

Topology features

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

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current

Housing features

- Base isolation: Al₂O₃
- Convex shaped substrate for superior thermal contact
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

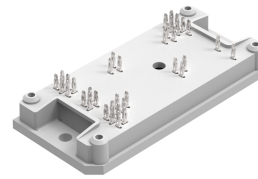
Target applications

- UPS
- Motor Drive
- Solar inverters

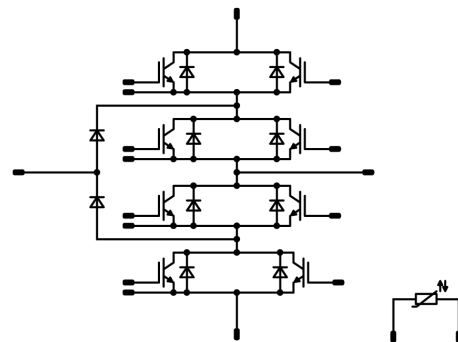
Types

- 10-PY06NIA100SA-M135F08Y

flow 1 12 mm housing



Schematic





Vincotech

10-PY06NIA100SA-M135F08Y
datasheet

Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		600	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	81	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	128	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 360\text{ V}$ $T_j = 150\text{ °C}$	6	μs
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Buck Diode

Peak repetitive reverse voltage	V_{RRM}		600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	70	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	102	W
Maximum junction temperature	T_{jmax}		175	$^{\circ}\text{C}$

Boost Switch

Collector-emitter voltage	V_{CES}		600	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	81	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	128	W
Gate-emitter voltage	V_{GES}		± 20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$, $V_{CC} = 360\text{ V}$ $T_j = 150\text{ °C}$	6	μs
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
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	113	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Sw. Inv. Diode

Peak repetitive reverse voltage	V_{RRM}		600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	76	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	113	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
Isolation voltage	V_{isol}	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			7,86	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production



Vincotech

10-PY06NIA100SA-M135F08Y
datasheet

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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0016	25	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		100	25 125 150	1,05	1,51 1,68 1,73	1,85 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	600		25			5,2	μA
Gate-emitter leakage current	I_{GES}		20	0		25			1200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							6280		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25		25		400		pF
Reverse transfer capacitance	C_{res}							186		pF

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,74		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		160,2 166 189,4		ns
Rise time	t_r					25 125 150		26,2 29,4 30,8		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		270,4 289,8 295,8		ns
Fall time	t_f					25 125 150		99,52 116,48 122,46		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 5,07$ μC $Q_{tFWD} = 8,51$ μC $Q_{tFWD} = 9,36$ μC				25 125 150		1,89 2,33 2,4		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,9 3,67 3,81		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		

Buck Diode

Static

Forward voltage	V_F				100	25 125 150	1,2	1,7 1,72 1,7	1,9 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 600$ V				25			660	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,93		K/W
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Dynamic

Peak recovery current	I_{RM}					25 125 150		86,4 107,84 113,01		A
Reverse recovery time	t_{rr}					25 125 150		126,6 148,14 164,29		ns
Recovered charge	Q_r	$di/dt=3904$ A/μs $di/dt=3386$ A/μs $di/dt=3917$ A/μs	±15	350	100	25 125 150		5,07 8,51 9,36		μC
Reverse recovered energy	E_{rec}					25 125 150		1,15 2 2,24		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		3385 1410 1871		A/μs



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Characteristic Values

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

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$				0,0016	25	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15			100	25 125 150	1,05	1,51 1,68 1,73	1,85 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	600			25			5,2	μA
Gate-emitter leakage current	I_{GES}		20	0			25			1200	nA
Internal gate resistance	r_g								None		Ω
Input capacitance	C_{ies}								6280		pF
Output capacitance	C_{oes}	$f = 1$ Mhz	0	25			25		400		pF
Reverse transfer capacitance	C_{res}								186		pF

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)							0,74		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$						25 125 150		164,2 187,8 169		ns
Rise time	t_r						25 125 150		29,2 31,6 32,4		ns
Turn-off delay time	$t_{d(off)}$						25 125 150		273,2 292,6 298		ns
Fall time	t_f						25 125 150		96,86 113,62 116,07		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,37$ μC $Q_{tFWD} = 7,76$ μC $Q_{tFWD} = 9,27$ μC					25 125 150		1,93 2,42 2,55		mWs
Turn-off energy (per pulse)	E_{off}						25 125 150		3,22 4,07 4,26		mWs



Vincotech

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				100	25 125 150	1,2	1,69 1,68 1,66	1,9 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 600$ V				25			54	μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,84		K/W
Dynamic										
Peak recovery current	I_{RM}					25 125 150		70,73 85,51 89,9		A
Reverse recovery time	t_{rr}					25 125 150		129,5 159,9 287,1		ns
Recovered charge	Q_r	$di/dt=3774$ A/μs $di/dt=4012$ A/μs $di/dt=3529$ A/μs	±15	350	100	25 125 150		4,37 7,76 9,27		μC
Reverse recovered energy	E_{rec}					25 125 150		1,03 1,91 2,37		mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$					25 125 150		2960 513,04 550,81		A/μs



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				100	25 125 150	1,2	1,69 1,68 1,66	1,9 ⁽¹⁾	V
Reverse leakage current	I_R	$V_T = 600$ V				25			54	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,84		K/W
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Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R25	$A_{R/R}$	$R_{25} = 22$ kΩ				25	-5		5	%
Deviation of R100		$R_{100} = 1486$ Ω				100	-12		14	
Power dissipation	P							200		mW
Power dissipation constant	d					25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3 %						3950		K
B-value	$B_{(25/100)}$	Tol. ±3 %						3998		K
Vincotech Thermistor Reference									B	

⁽¹⁾ Value at chip level

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

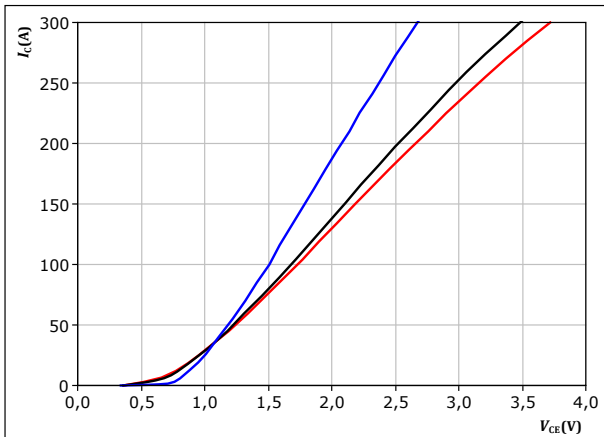


Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

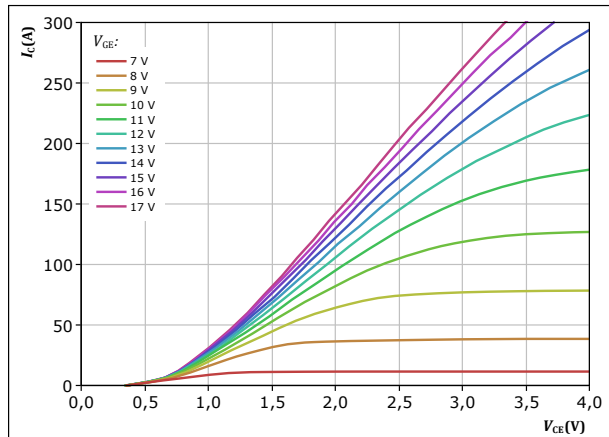


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 2. IGBT

Typical output characteristics

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

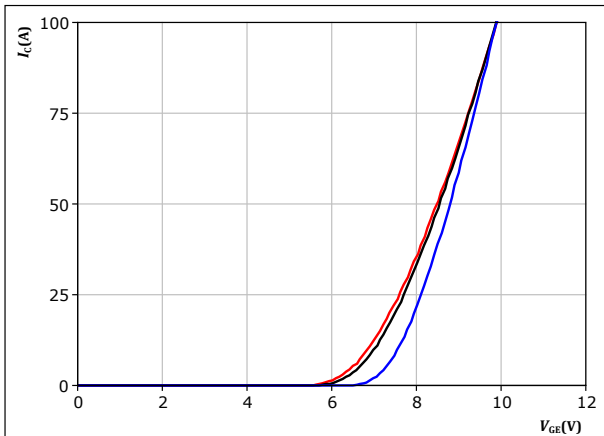


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

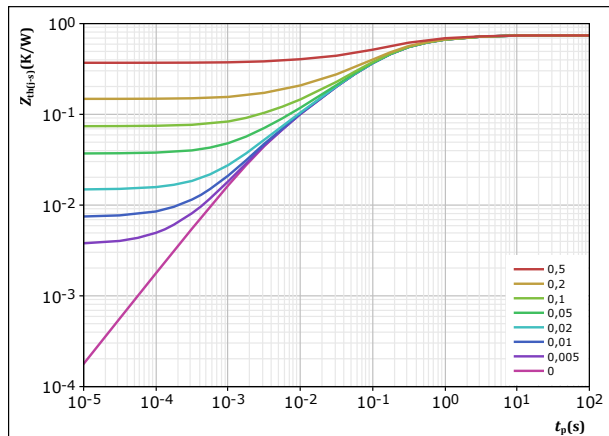


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,74 \text{ K/W}$
IGBT thermal model values

R (K/W)	τ (s)
7,73E-02	2,46E+00
1,47E-01	5,25E-01
3,44E-01	1,46E-01
1,31E-01	3,07E-02
4,16E-02	3,80E-03

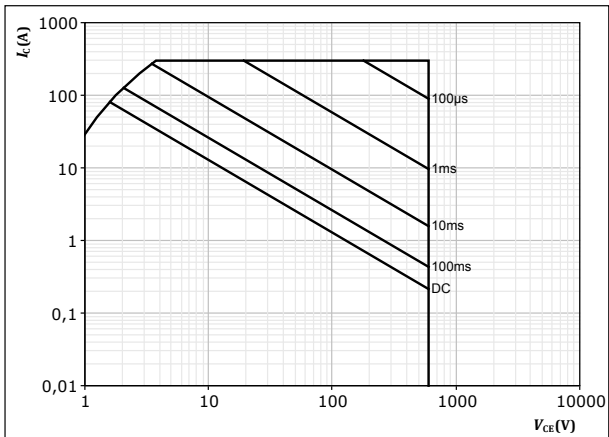


Buck Switch Characteristics

figure 5. IGBT

Safe operating area

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



$D =$ single pulse
 $T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



Buck Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

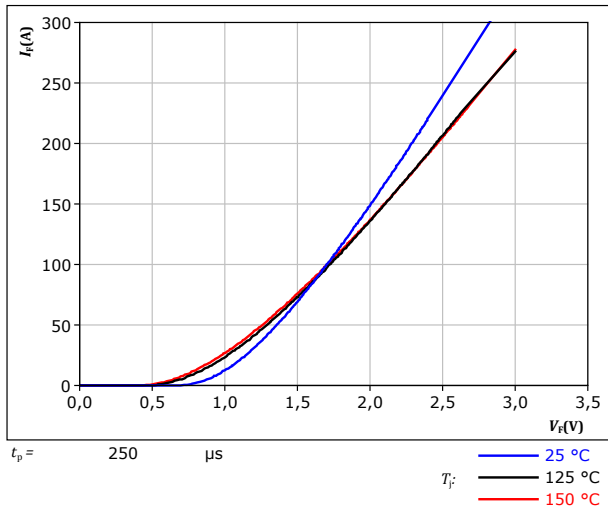
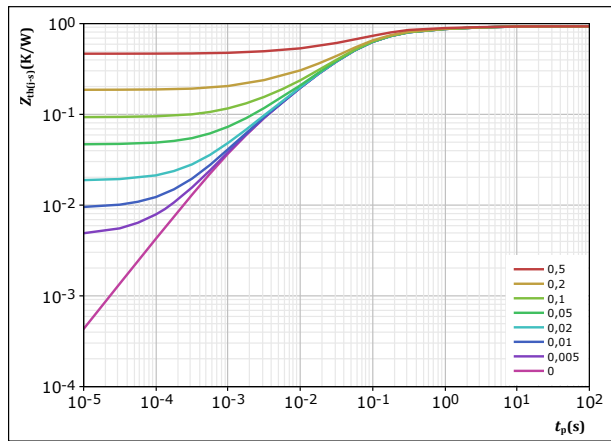


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$
 $R_{th(j-s)} = 0,932 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
6,39E-02	3,10E+00
1,35E-01	4,29E-01
5,42E-01	7,16E-02
1,52E-01	1,27E-02
3,95E-02	1,69E-03



Boost Switch Characteristics

figure 8. IGBT

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

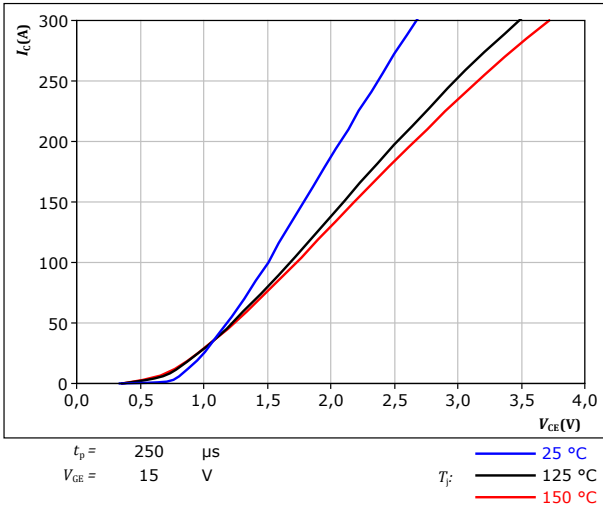


figure 9. IGBT

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

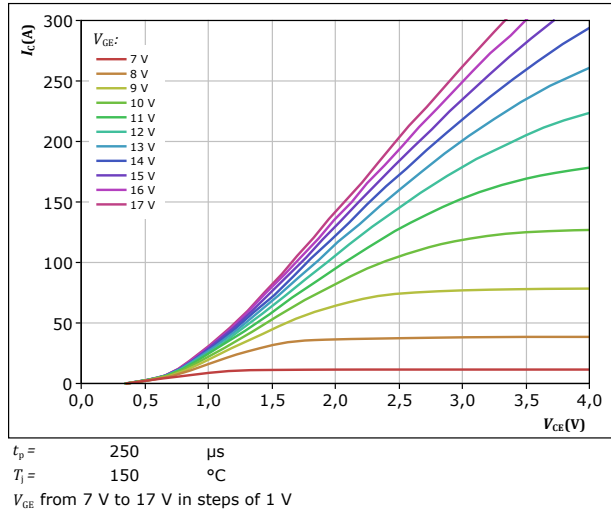


figure 10. IGBT

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

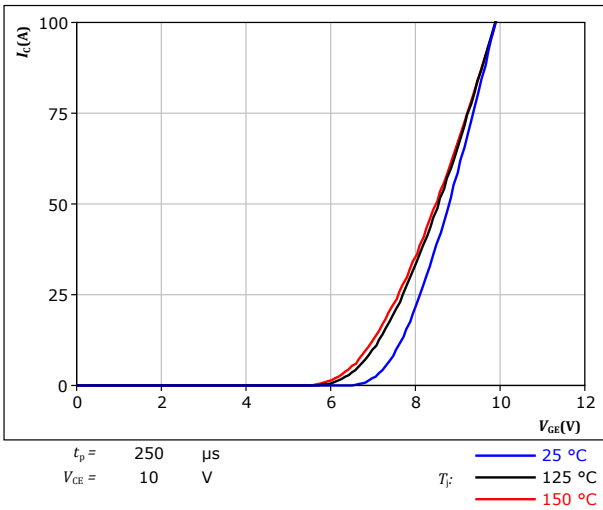
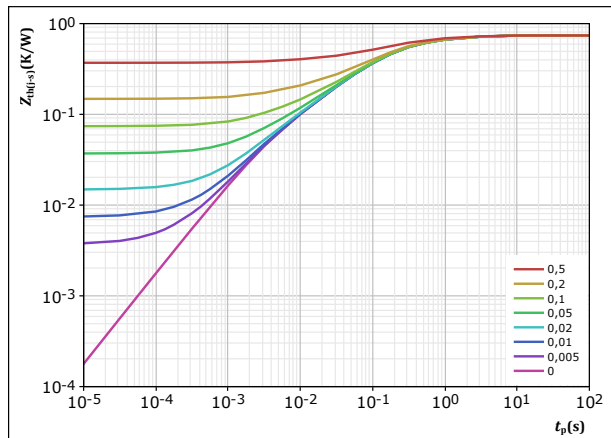


figure 11. IGBT

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



IGBT thermal model values

R (K/W)	τ (s)
7,73E-02	2,46E+00
1,47E-01	5,25E-01
3,44E-01	1,46E-01
1,31E-01	3,07E-02
4,16E-02	3,80E-03

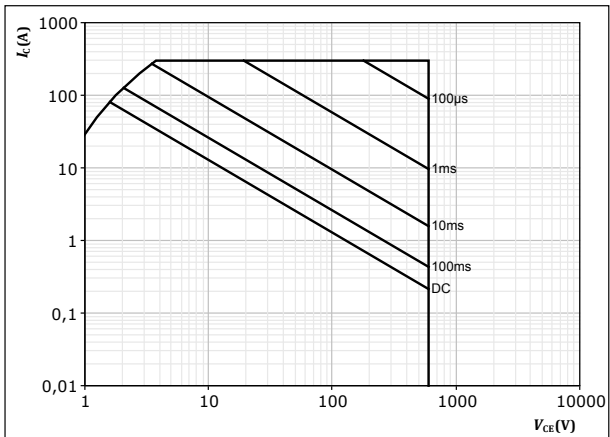


Boost Switch Characteristics

figure 12. IGBT

Safe operating area

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



$D =$ single pulse
 $T_s = 80 \text{ }^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$



Boost Diode Characteristics

figure 13. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

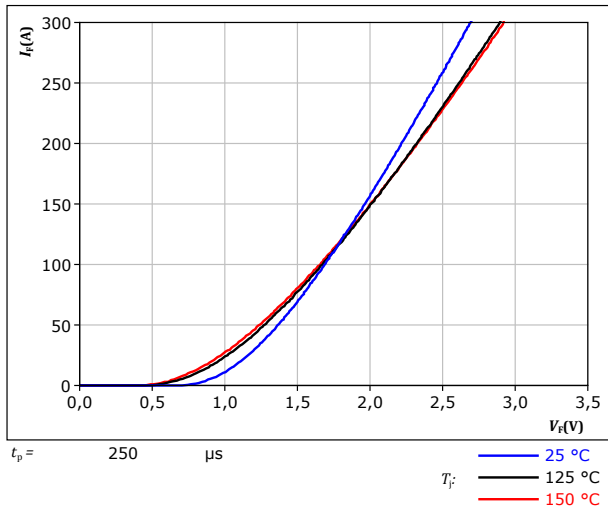
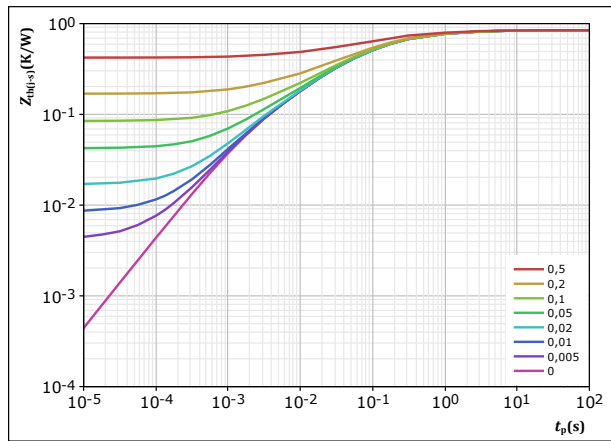


figure 14. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,844 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
4,97E-02	4,25E+00
1,90E-01	5,72E-01
3,80E-01	9,11E-02
1,76E-01	1,44E-02
4,94E-02	1,79E-03



Boost Sw. Inv. Diode Characteristics

figure 15. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

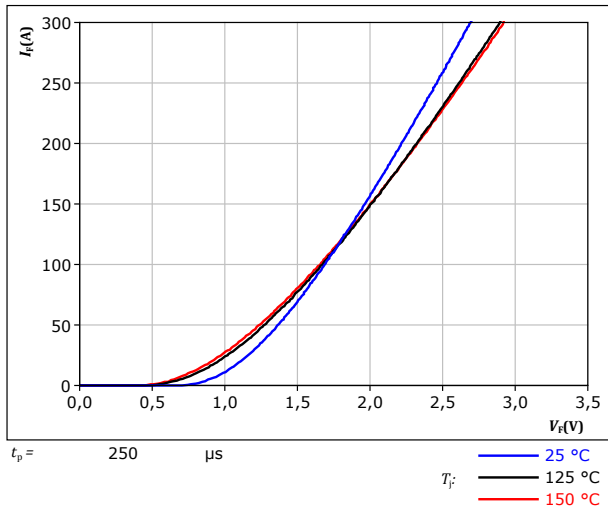
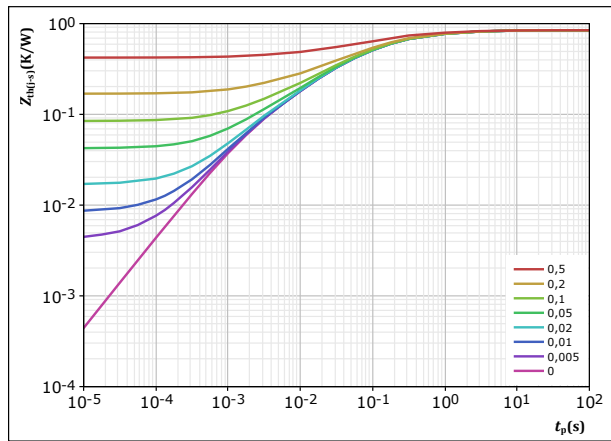


figure 16. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	0,844	K/W
FWD thermal model values		
R (K/W)	τ (s)	
4,97E-02	4,25E+00	
1,90E-01	5,72E-01	
3,80E-01	9,11E-02	
1,76E-01	1,44E-02	
4,94E-02	1,79E-03	

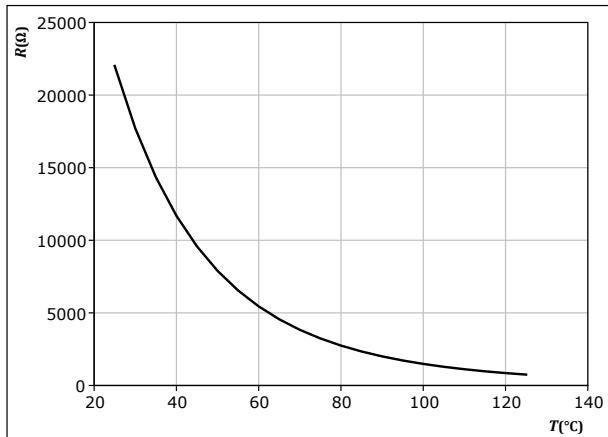


Thermistor Characteristics

figure 17. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

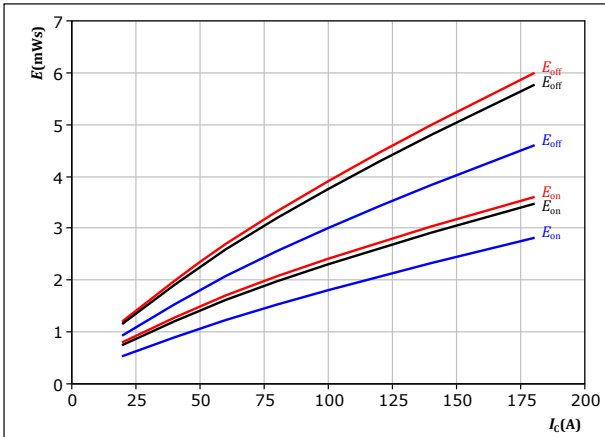




Buck Switching Characteristics

figure 18. IGBT

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

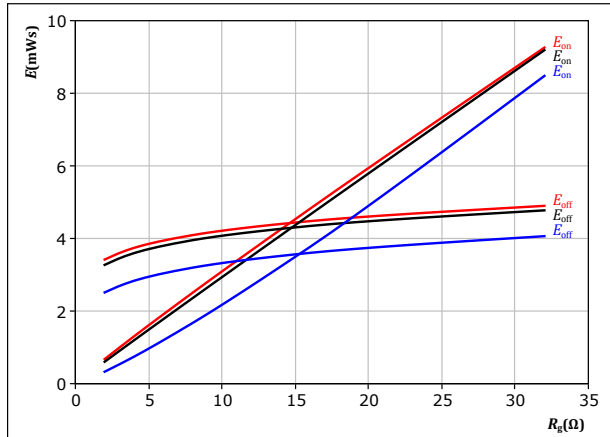


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 19. IGBT

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

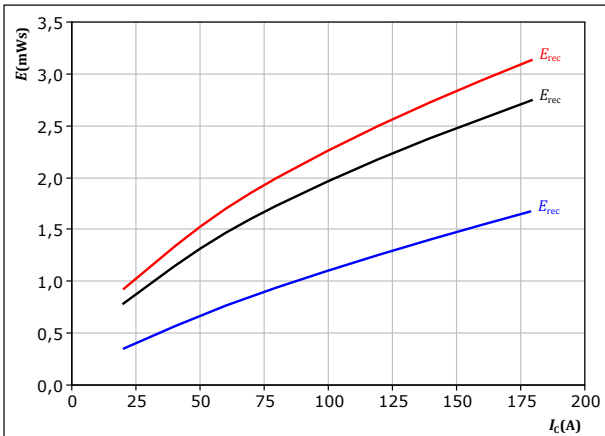


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 100$ A

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 20. FWD

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

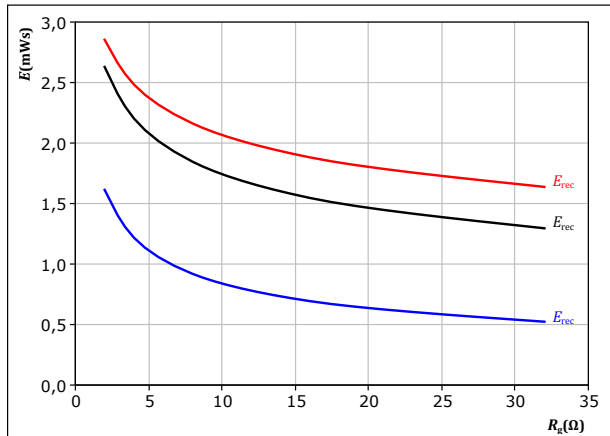


With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω

T_j : — 25 °C
 — 125 °C
 — 150 °C

figure 21. 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
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 100$ A

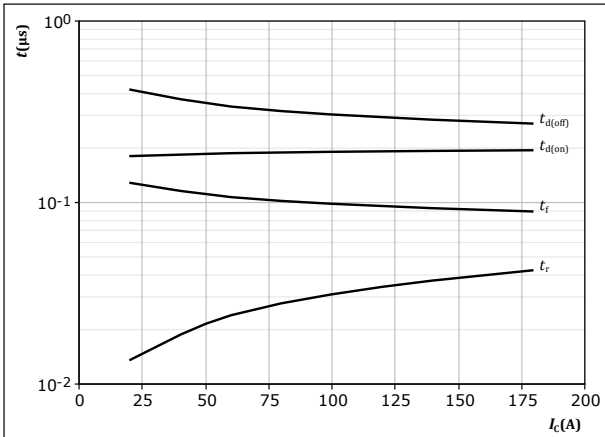
T_j : — 25 °C
 — 125 °C
 — 150 °C



Buck Switching Characteristics

figure 22. IGBT

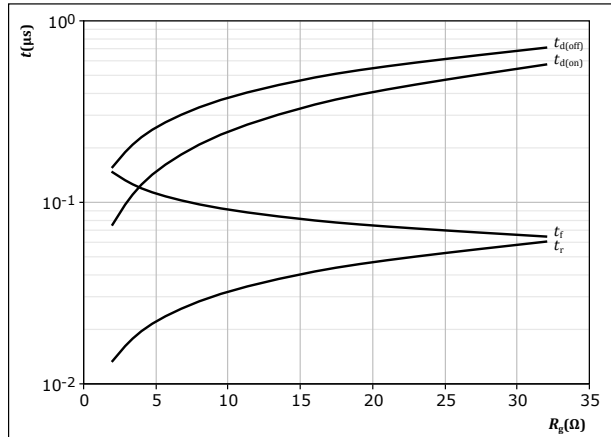
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω

figure 23. IGBT

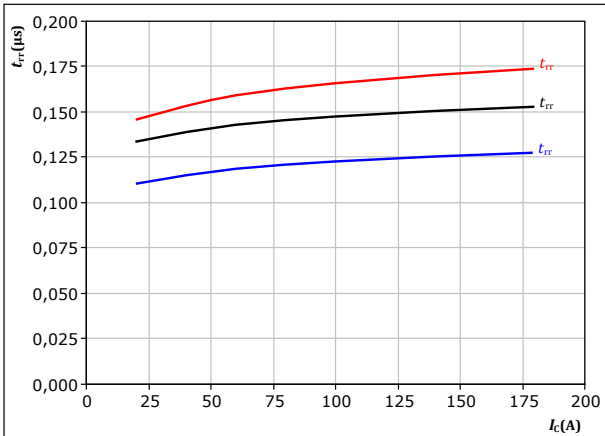
Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 100$ A

figure 24. FWD

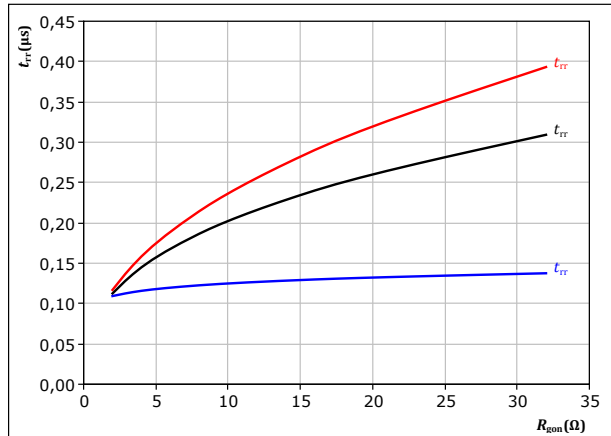
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 8$ Ω
 T_j : — 25 °C
— 125 °C
— 150 °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
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 100$ A
 T_j : — 25 °C
— 125 °C
— 150 °C

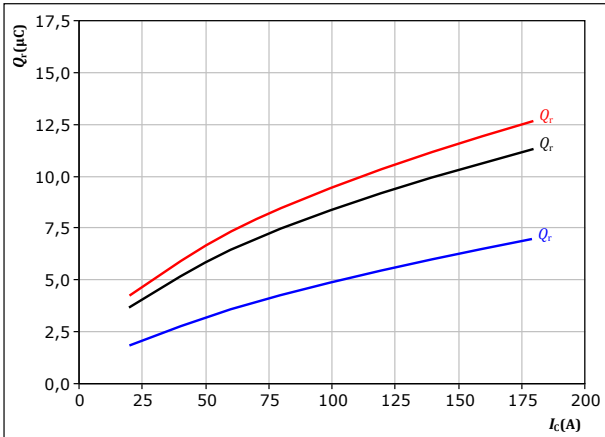


Buck Switching Characteristics

figure 26. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

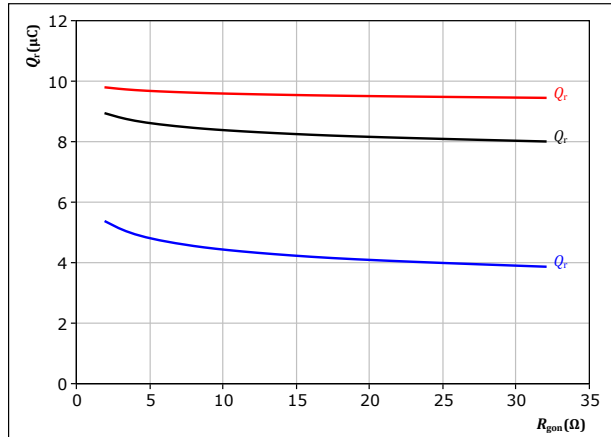
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 27. FWD

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

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



With an inductive load at

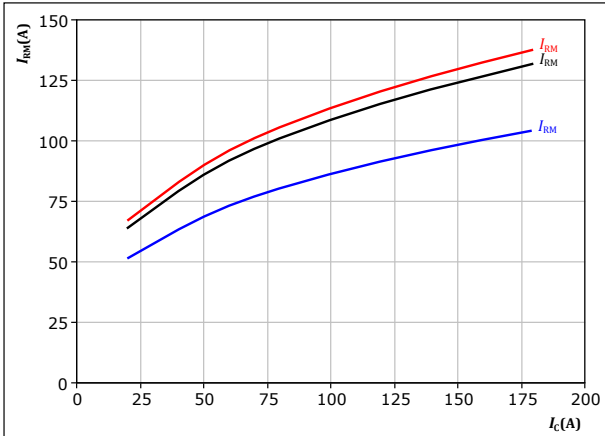
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$

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

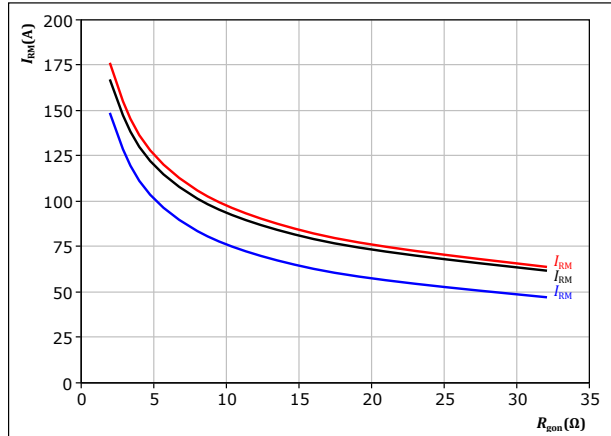
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 29. 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

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$

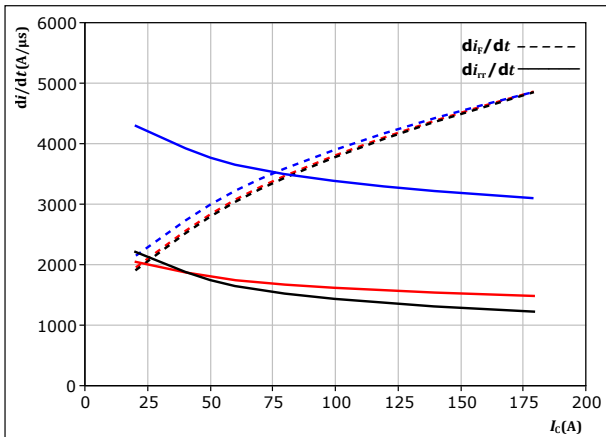
T_j :
— 25 °C
— 125 °C
— 150 °C



Buck Switching Characteristics

figure 30. FWD

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

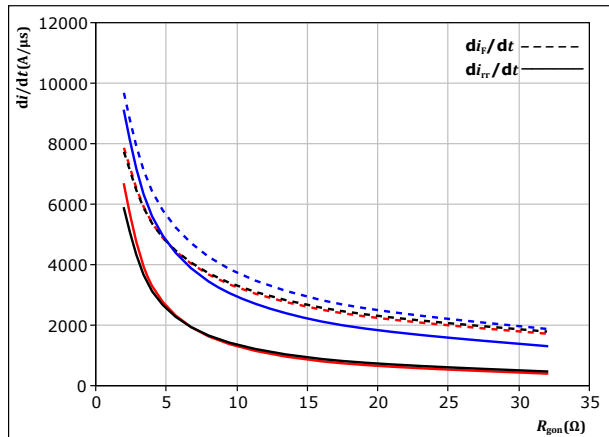


With an inductive load at

$V_{CE} = 350$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$R_{gon} = 8$ Ω	$T_j = 150$ °C

figure 31. FWD

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

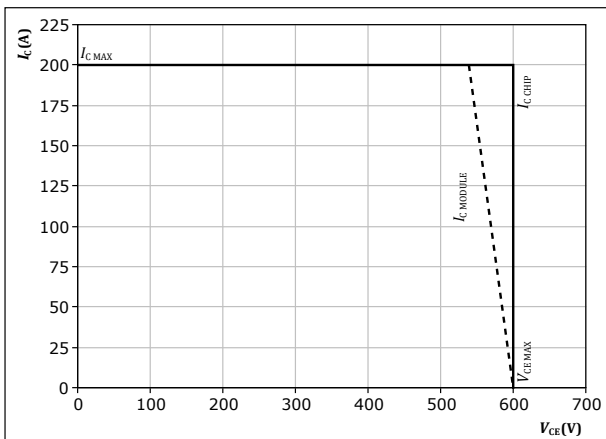


With an inductive load at

$V_{CE} = 350$ V	$T_j = 25$ °C
$V_{GE} = \pm 15$ V	$T_j = 125$ °C
$I_c = 100$ A	$T_j = 150$ °C

figure 32. IGBT

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



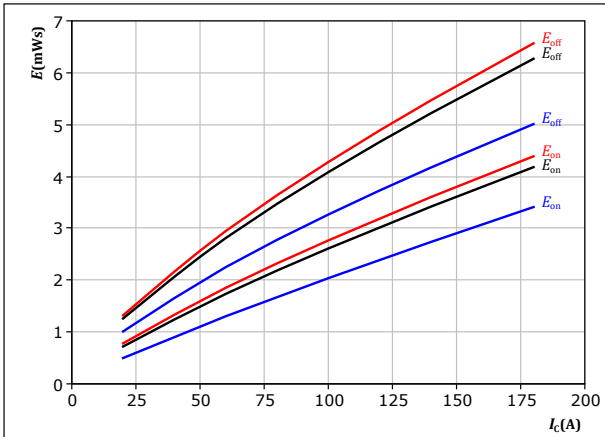
At $T_j = 150$ °C
 $R_{gon} = 8$ Ω
 $R_{goff} = 8$ Ω



Boost Switching Characteristics

figure 33. IGBT

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

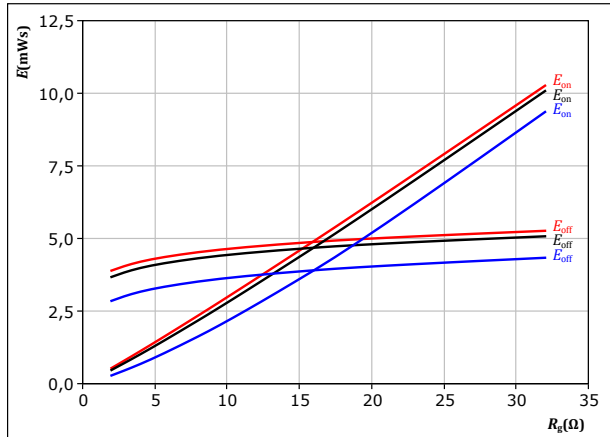


With an inductive load at

$V_{CE} =$	350	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$R_{gon} =$	8	Ω		—	150 °C
$R_{goff} =$	8	Ω			

figure 34. IGBT

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

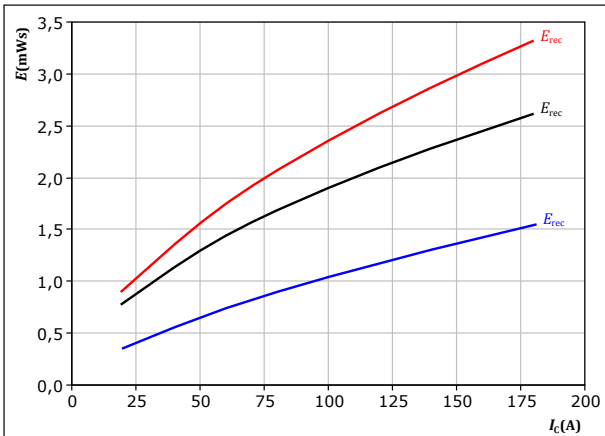


With an inductive load at

$V_{CE} =$	350	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$I_c =$	100	A		—	150 °C

figure 35. FWD

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

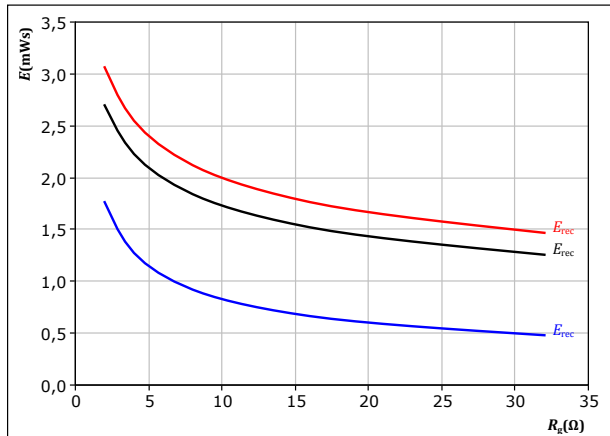


With an inductive load at

$V_{CE} =$	350	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$R_{gon} =$	8	Ω		—	150 °C

figure 36. 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

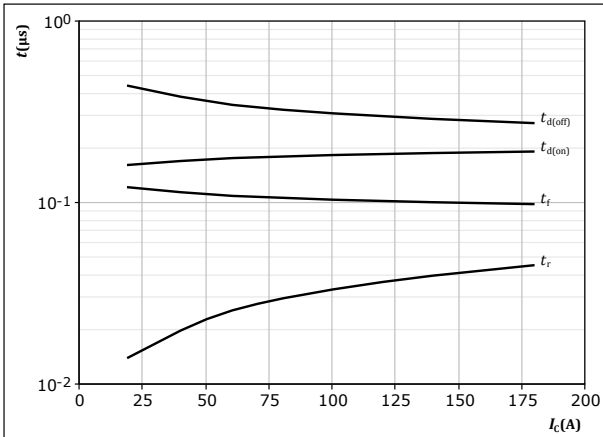
$V_{CE} =$	350	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$I_c =$	100	A		—	150 °C



Boost Switching Characteristics

figure 37. IGBT

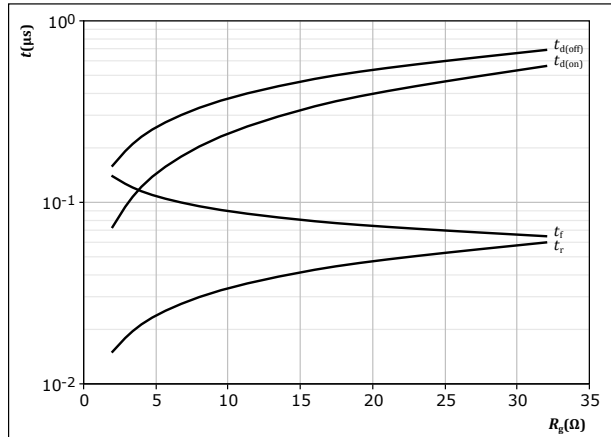
Typical switching times as a function of collector current
 $t = f(I_c)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $R_{goff} = 8 \text{ } \Omega$

figure 38. IGBT

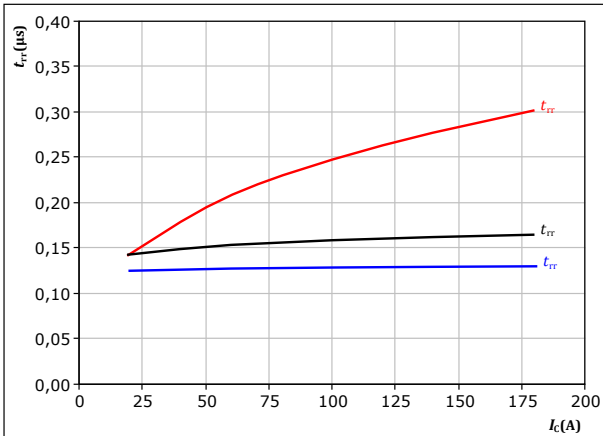
Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$

figure 39. FWD

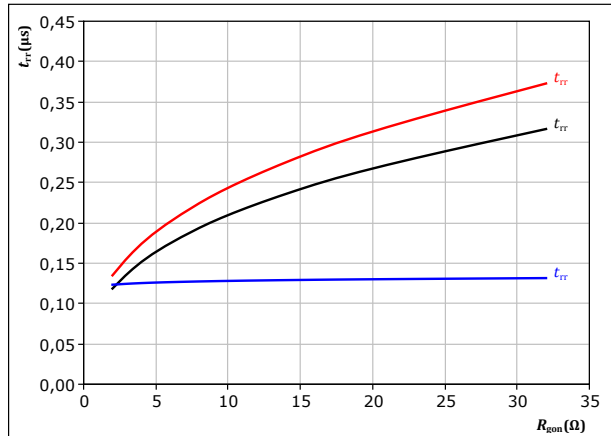
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



With an inductive load at
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \text{ } \Omega$
 $T_j:$ — 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
 $V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

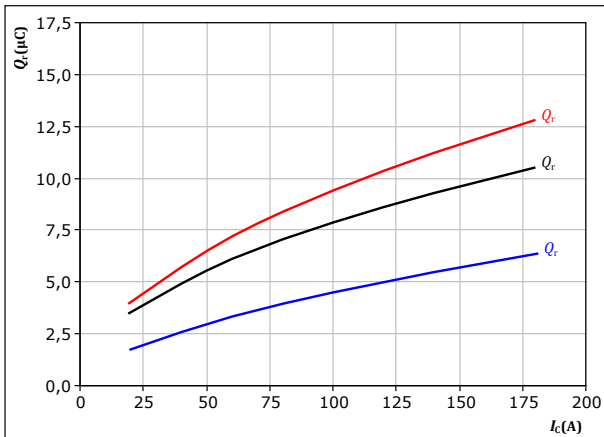


Boost Switching Characteristics

figure 41. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

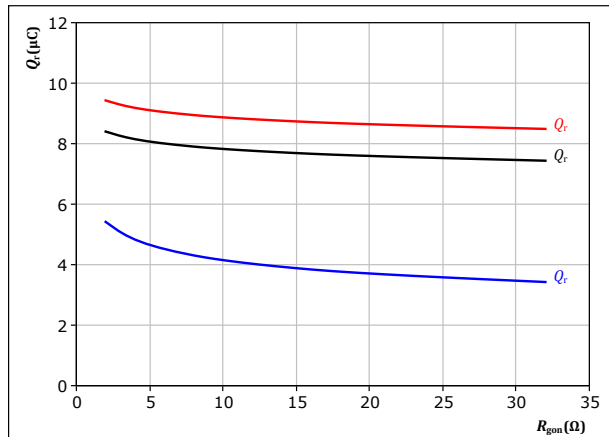
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 42. FWD

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

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



With an inductive load at

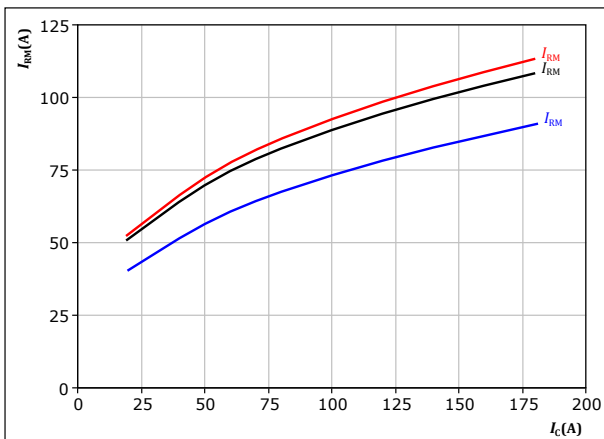
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$

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

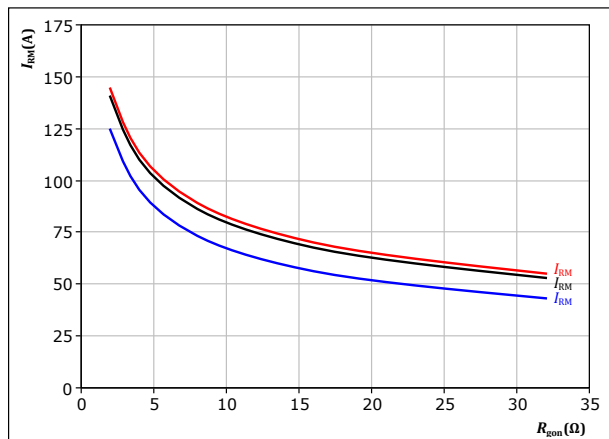
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 8 \ \Omega$

T_j : — 25 °C
— 125 °C
— 150 °C

figure 44. 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

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 100 \text{ A}$

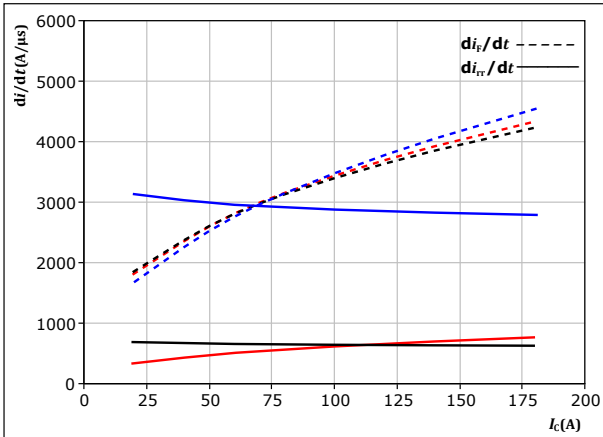
T_j : — 25 °C
— 125 °C
— 150 °C



Boost Switching Characteristics

figure 45. FWD

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

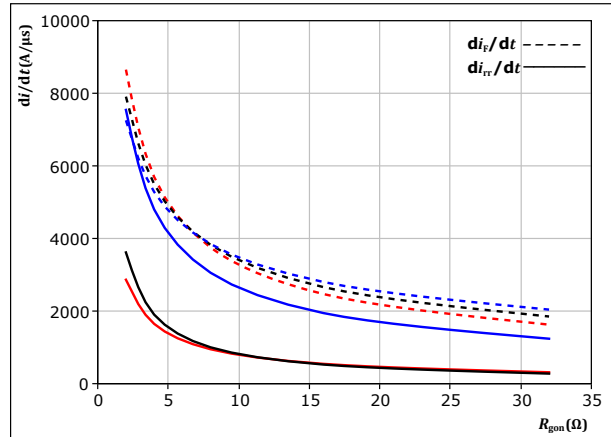


With an inductive load at

$V_{CE} =$	350	V	$T_j =$	25 °C
$V_{GE} =$	±15	V		125 °C
$R_{gon} =$	8	Ω		150 °C

figure 46. FWD

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



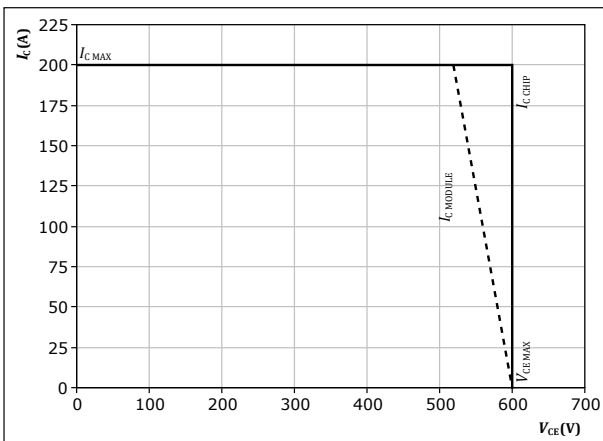
With an inductive load at

$V_{CE} =$	350	V	$T_j =$	25 °C
$V_{GE} =$	±15	V		125 °C
$I_c =$	100	A		150 °C

figure 47. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



At $T_j =$ 150 °C
 $R_{gon} =$ 8 Ω
 $R_{goff} =$ 8 Ω



Switching Definitions

figure 48. IGBT

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

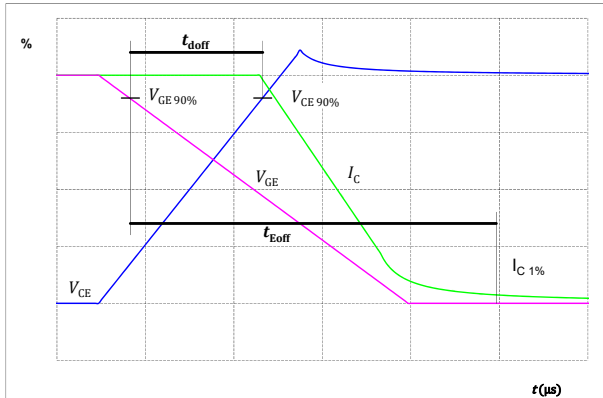


figure 49. IGBT

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

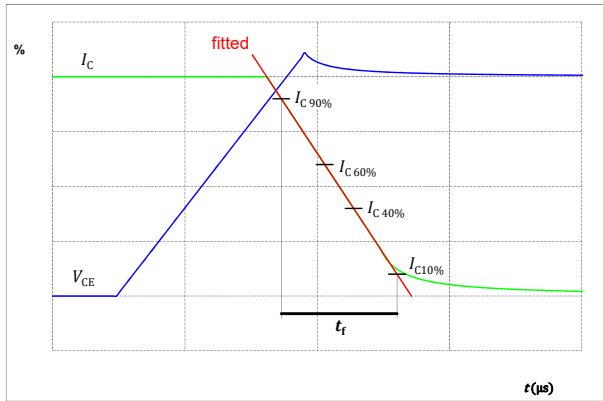
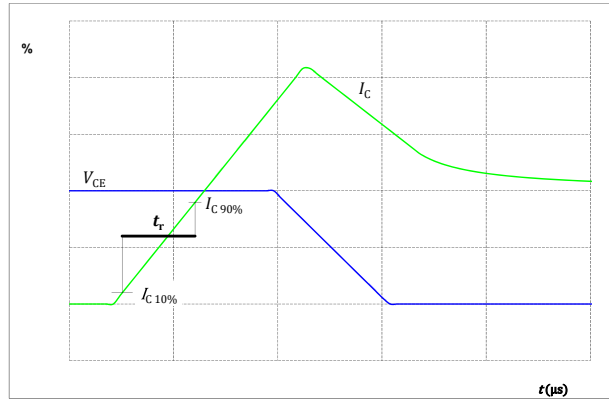


figure 51. IGBT

Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 52. FWD

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

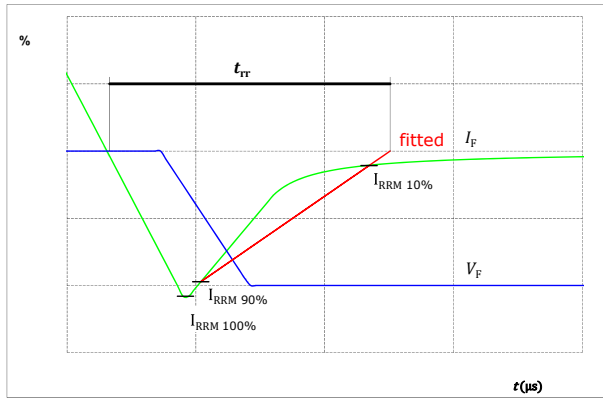
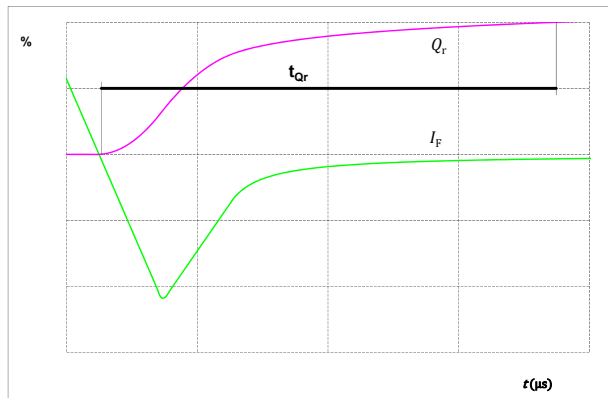


figure 53. FWD

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





Vincotech

10-PY06NIA100SA-M135F08Y
datasheet

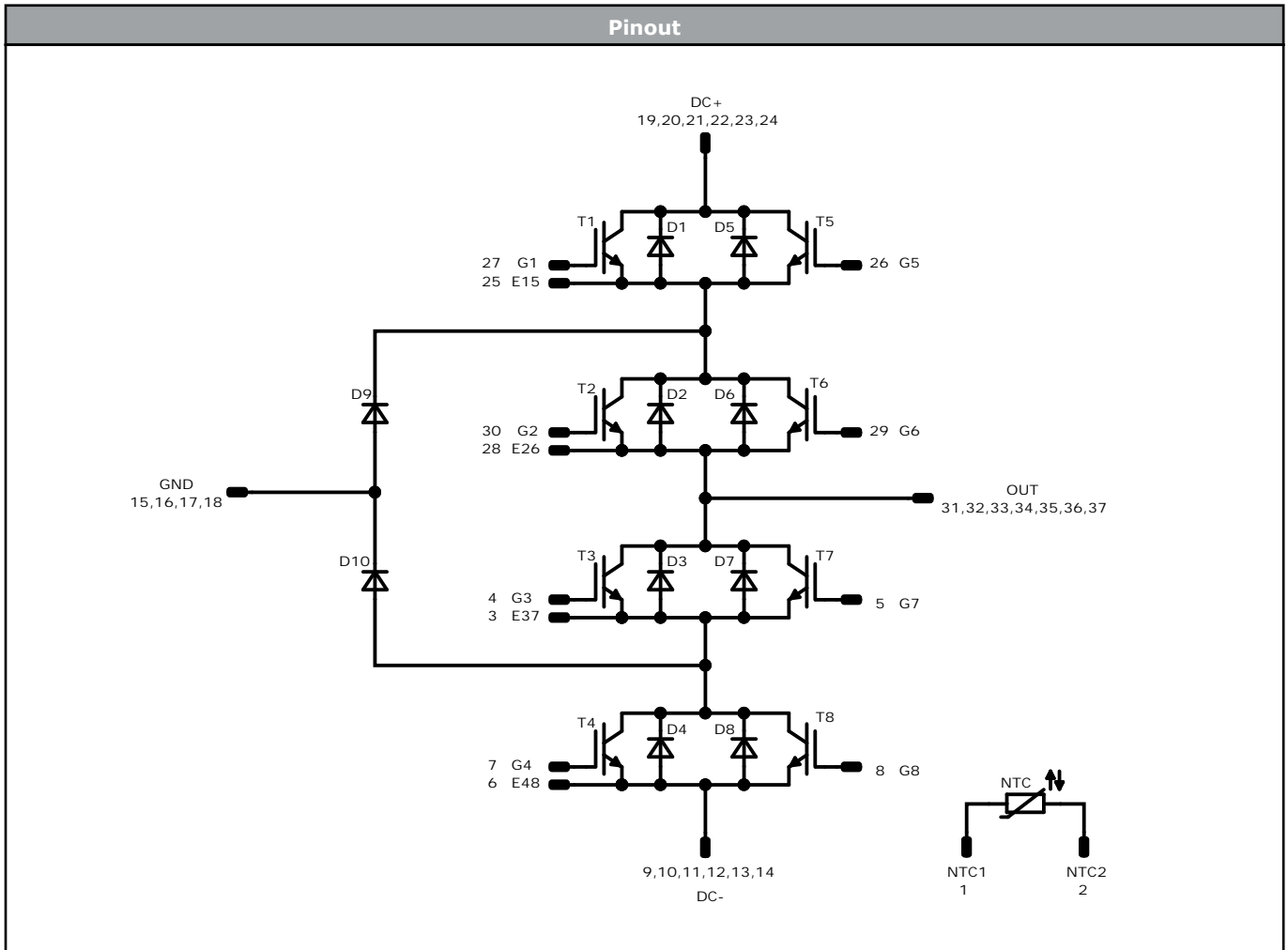
Ordering Code	
Version	Ordering Code
Without thermal paste	10-PY06NIA100SA-M135F08Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PY06NIA100SA-M135F08Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PY06NIA100SA-M135F08Y-/3/

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

Pin table [mm]			
Pin	X	Y	Function
1	52,2	6,9	NTC1
2	52,2	0	NTC2
3	36,2	6,75	E37
4	33,2	7,9	G3
5	33,2	4,9	G7
6	9,2	5,75	E48
7	6,2	6,9	G4
8	6,2	3,9	G8
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	2,7	12,75	GND
16	0	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	E15
26	21,3	21,3	G5
27	21,3	24,3	G1
28	43	22,15	E26
29	46	21	G6
30	46	24	G2
31	52,2	20,1	OUT
32	49,5	22,8	OUT
33	52,2	22,8	OUT
34	49,5	25,5	OUT
35	52,2	25,5	OUT
36	49,5	28,2	OUT
37	52,2	28,2	OUT



Vincotech



Identification					
ID	Component	Voltage	Current	Function	Comment
T1, T5, T4, T8	IGBT	600 V	100 A	Buck Switch	
D9, D10	FWD	600 V	100 A	Buck Diode	
T3, T7, T2, T6	IGBT	600 V	100 A	Boost Switch	
D1, D5, D4, D8	FWD	600 V	100 A	Boost Diode	
D2, D6, D3, D7	FWD	600 V	100 A	Boost Sw. Inv. Diode	
NTC	Thermistor			Thermistor	




Vincotech

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</i> 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
10-PY06NIA100SA-M135F08Y-D5-14	7 May. 2023	New Datasheet format, module is unchanged Separate datasheet Correct thermal characteristic	

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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.