



flowNPC 2

1200 V / 200 A

Topology features

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

Component features

- High speed switching
- Low collector emitter saturation voltage
- Low turn-off losses
- Optimized for hard switching topologies
- Positive temperature coefficient

Housing features

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

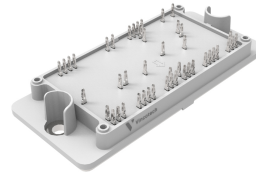
Target applications

- Energy Storage Systems

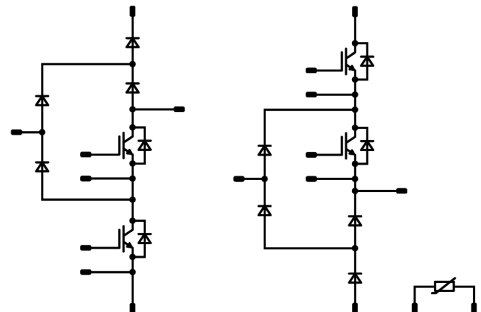
Types

- 30-PT12NIA200H7-LG00F18Y

flow 2 13 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	600	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	272	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	204	W
Maximum junction temperature	T_{jmax}		175	°C

Buck Sw. Protection Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	56	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	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Boost Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	600	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	272	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C

Boost Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	204	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	204	W
Maximum junction temperature	T_{jmax}		175	°C



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datasheet

Maximum Ratings

$T_j = 25\text{ °C}$, 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	29	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	61	W
Maximum junction temperature	T_{jmax}		175	°C

Boost D. Protection Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	29	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	61	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* $t_p = 2\text{ s}$	6800	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_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Buck Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		200	25 125 150		1,78 1,94 1,98	2,15 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			8	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							26000		pF
Output capacitance	C_{oes}	$f = 100$ kHz	0	25		25		480		pF
Reverse transfer capacitance	C_{res}							144		pF
Gate charge	Q_g	$V_{CC} = 960$ V	0/15		200	25		1428		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,35		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		155,44 158,01 159		ns
Rise time	t_r					25 125 150		16,21 17,72 18,33		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		156,3 186,55 194,09		ns
Fall time	t_f					25 125 150		25,9 48,3 52,72		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 4,8$ μC $Q_{tFWD} = 13,02$ μC $Q_{tFWD} = 15,36$ μC				25 125 150		6,1 7,34 7,77		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,68 8,21 9,3		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			200	25 125 150		2,72 2,42 2,34	3 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 1200$ V			25			8		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,47			K/W
Dynamic										
Peak recovery current	I_{RM}				25 125 150		203,71 288,3 312,4			A
Reverse recovery time	t_{rr}				25 125 150		47,89 136,31 151,8			ns
Recovered charge	Q_r	$di/dt=10556$ A/μs $di/dt=10133$ A/μs $di/dt=10615$ A/μs	±15	600	200	25 125 150	4,8 13,02 15,36			μC
Reverse recovered energy	E_{rec}				25 125 150		1,23 4,8 5,81			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		12982,23 12192,43 11752,09			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		2,62 2,43 2,38	3 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			4	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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Characteristic Values

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

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		200	25 125 150		1,78 1,94 1,98	2,15 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			8	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							26000		pF
Output capacitance	C_{oes}	$f = 100$ kHz	0	25		25		480		pF
Reverse transfer capacitance	C_{res}							144		pF
Gate charge	Q_g	$V_{CC} = 960$ V	0/15		200	25		1428		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,35		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$					25 125 150		159,2 161,48 162,63		ns
Rise time	t_r					25 125 150		16,55 19,14 19,18		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		157,48 185,56 193,36		ns
Fall time	t_f					25 125 150		22,57 37,97 43,98		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 6,01$ μC $Q_{tFWD} = 14,03$ μC $Q_{tFWD} = 16,48$ μC				25 125 150		8,32 9,92 10,34		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,67 7,7 8,5		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		
Boost Diode										
Static										
Forward voltage	V_F			200	25 125 150		2,72 2,42 2,34	3 ⁽¹⁾		V
Reverse leakage current	I_R	$V_r = 1200$ V			25			8		μA
Thermal										
Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,47			K/W
Dynamic										
Peak recovery current	I_{RM}				25 125 150		106,54 182,08 202,53			A
Reverse recovery time	t_{rr}				25 125 150		175,25 222,27 231,73			ns
Recovered charge	Q_r	$di/dt=6942$ A/μs $di/dt=7178$ A/μs $di/dt=7364$ A/μs	±15	600	200	25 125 150	6,01 14,03 16,48			μC
Reverse recovered energy	E_{rec}				25 125 150		1,79 4,83 5,75			mWs
Peak rate of fall of recovery current	$(di_r/dt)_{max}$				25 125 150		3237,35 3378,96 3090,64			A/μs



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Characteristic Values

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

Boost Sw. Inv. Diode

Static

Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			8	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,47		K/W
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Boost Sw. Protection Diode

Static

Forward voltage	V_F				40	25 125 150		2,84 2,6 2,49	3 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			4	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,57		K/W
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Boost D. Protection Diode

Static

Forward voltage	V_F				40	25 125 150		2,84 2,6 2,49	3 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 1200$ V				25			4	μA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,57		K/W
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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	

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R100	$A_{R/R}$	$R_{100} = 1484 \Omega$				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1 \%$						3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1 \%$						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
 $I_C = f(V_{CE})$

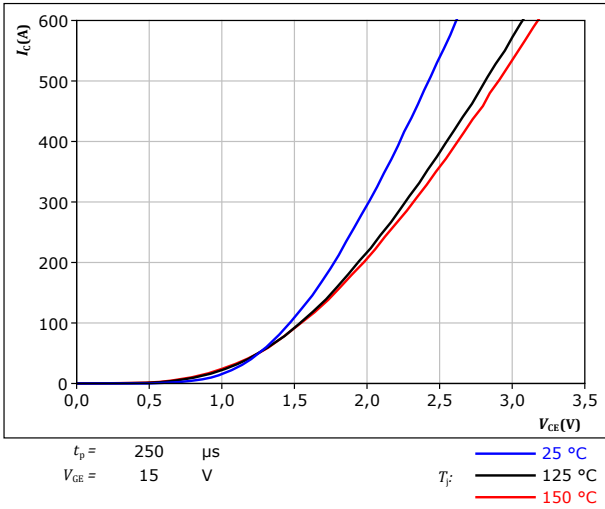


figure 2. IGBT

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

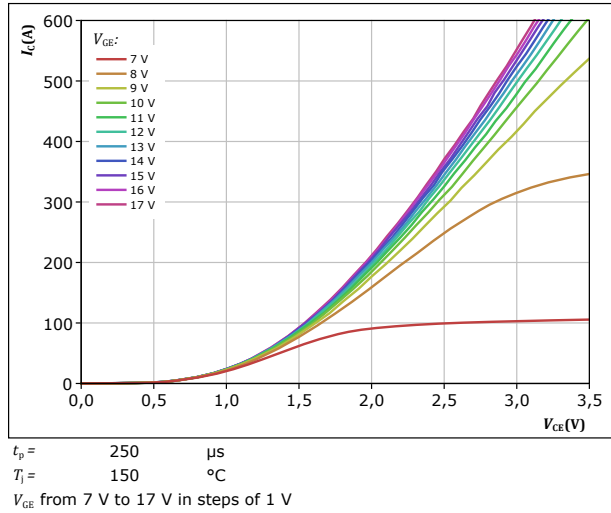


figure 3. IGBT

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

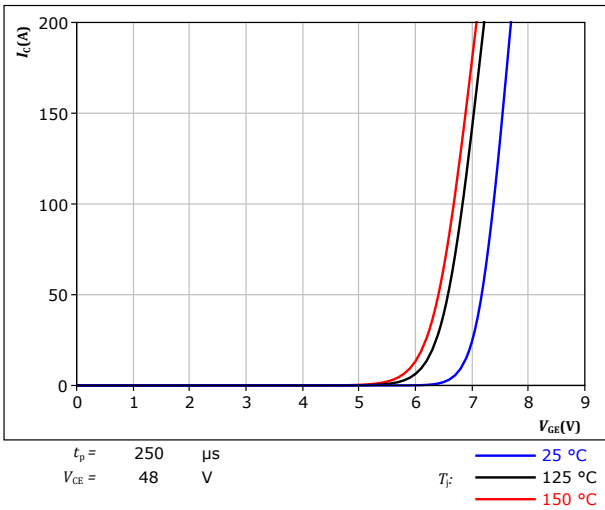
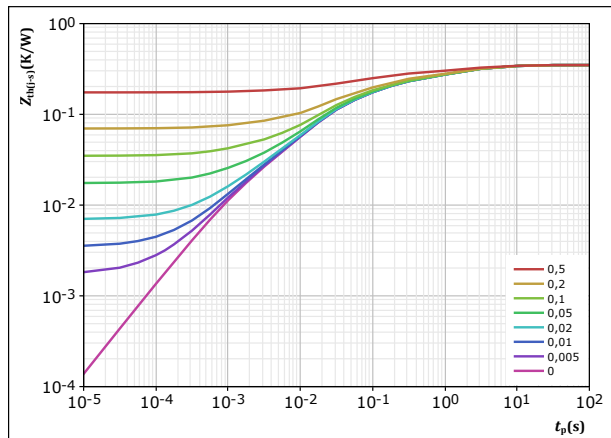


figure 4. IGBT

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



IGBT thermal model values

R (K/W)	τ (s)
3,91E-02	6,22E+00
9,03E-02	1,28E+00
1,12E-01	1,28E-01
9,67E-02	2,14E-02
1,15E-02	1,37E-03

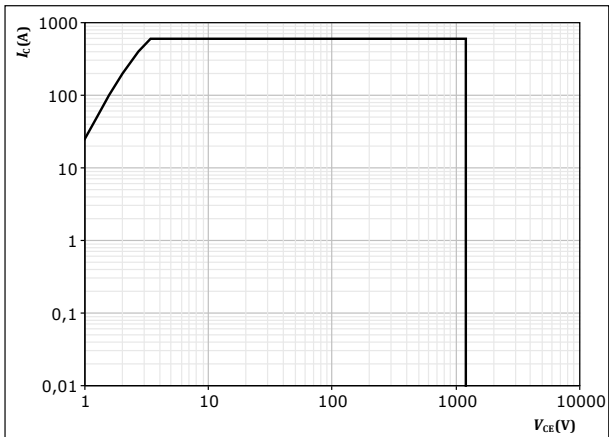


Buck Switch Characteristics

figure 5. IGBT

Safe operating area

$I_C = f(V_{CE})$

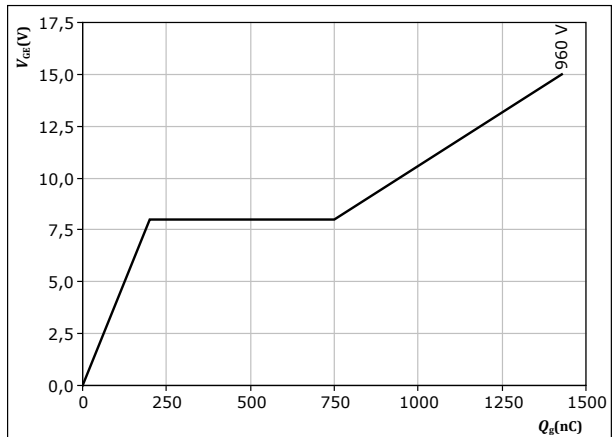


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. IGBT

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$



I_C = 100 A
T_j = 25 °C



Buck Diode Characteristics

figure 7. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

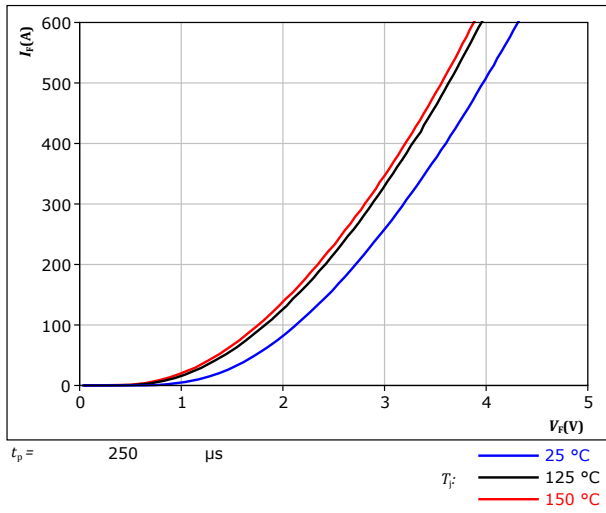
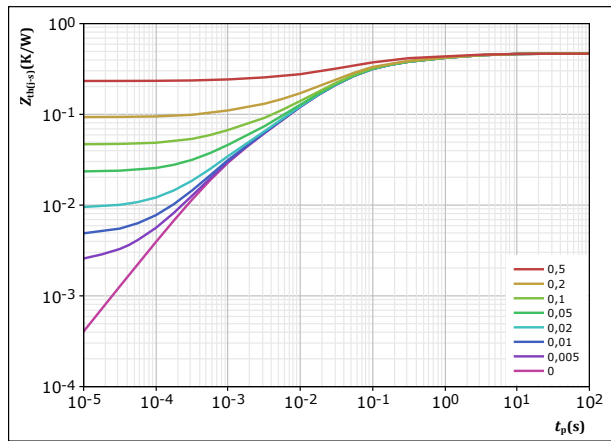


figure 8. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$
 $R_{th(j-s)} = 0,466 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
3,44E-02	4,32E+00
8,31E-02	6,95E-01
2,22E-01	6,24E-02
1,02E-01	1,07E-02
2,50E-02	9,13E-04



Buck Sw. Protection Diode Characteristics

figure 9. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

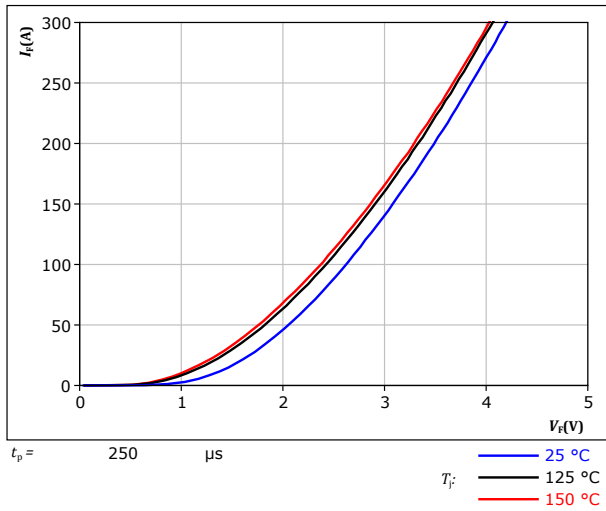
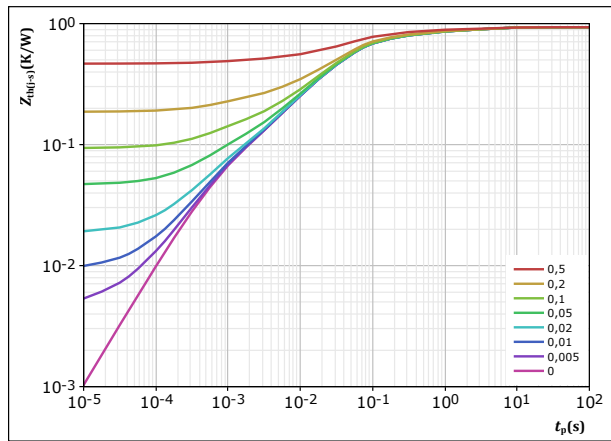


figure 10. FWD

Transient thermal impedance as a function of pulse width

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



$D = \frac{t_p}{T}$
 $R_{th(j-s)} = 0,934 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
8,83E-02	3,47E+00
1,47E-01	3,12E-01
5,08E-01	4,53E-02
1,37E-01	8,58E-03
5,39E-02	7,08E-04

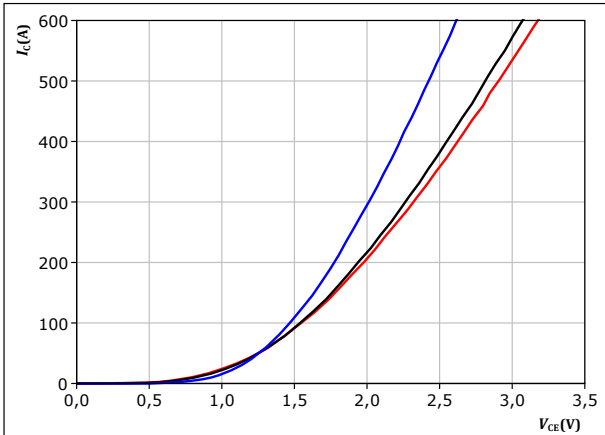


Boost Switch Characteristics

figure 11. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

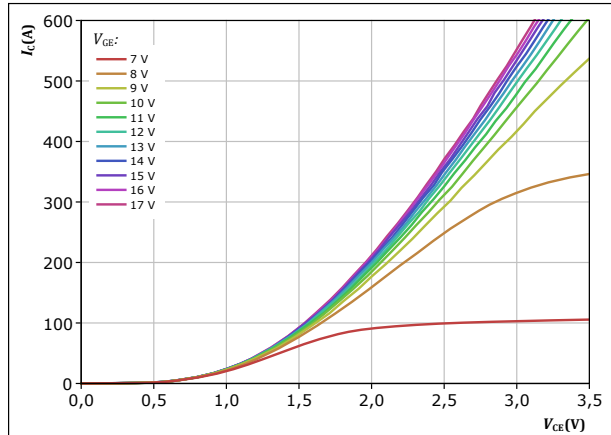


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 12. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

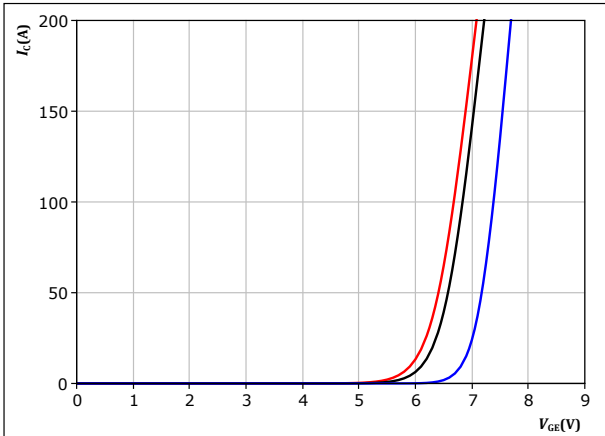


$t_p = 250 \mu s$
 $T_j = 150 \text{ °C}$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 13. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

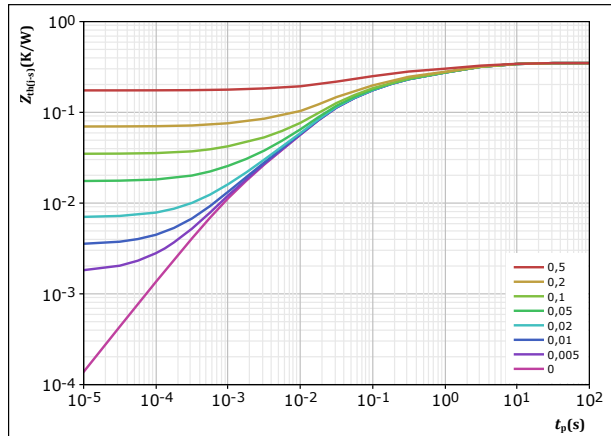


$t_p = 250 \mu s$
 $V_{CE} = 48 V$
 $T_j:$ 25 °C, 125 °C, 150 °C

figure 14. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,349 \text{ K/W}$
IGBT thermal model values

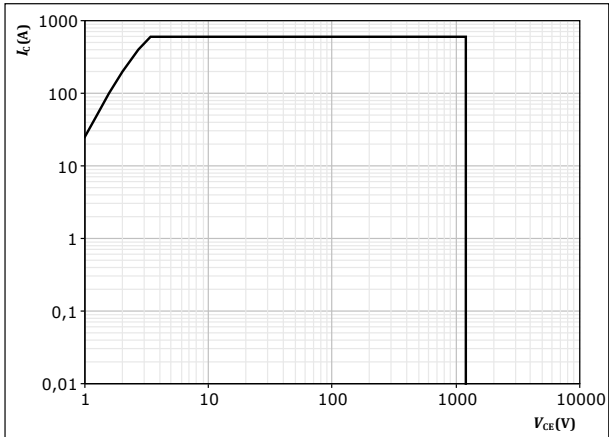
R (K/W)	τ (s)
3,91E-02	6,22E+00
9,03E-02	1,28E+00
1,12E-01	1,28E-01
9,67E-02	2,14E-02
1,15E-02	1,37E-03



Boost Switch Characteristics

figure 15. IGBT

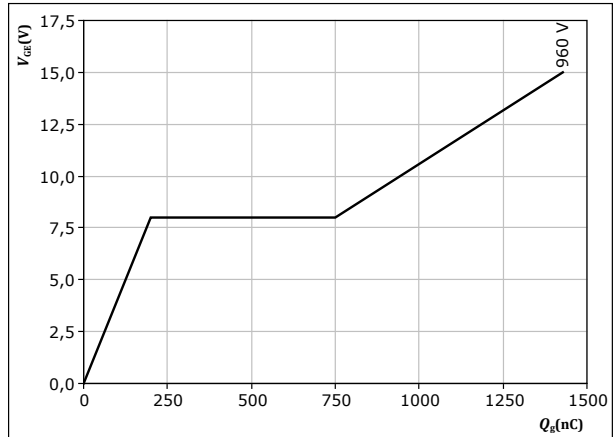
Safe operating area
 $I_C = f(V_{CE})$



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

figure 16. IGBT

Gate voltage vs gate charge
 $V_{GE} = f(Q_g)$



$I_C = 100 \text{ A}$
 $T_j = 25 \text{ } ^\circ\text{C}$



Boost Diode Characteristics

figure 17. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

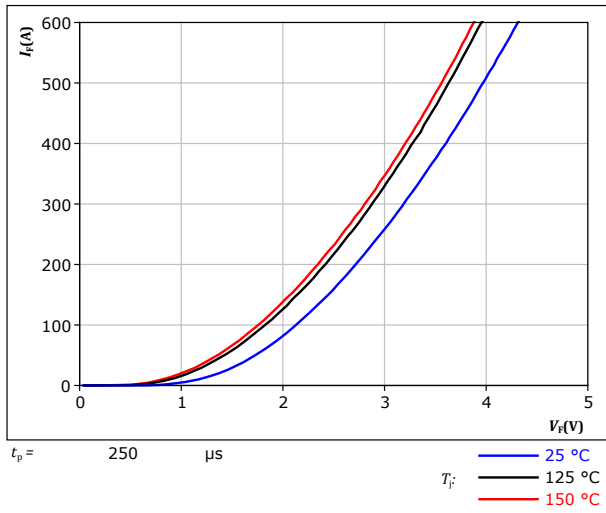
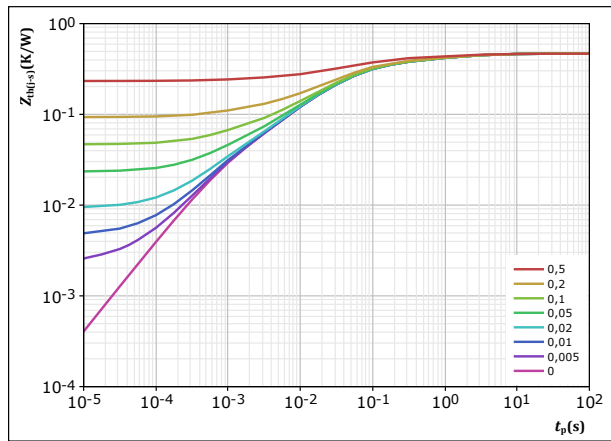


figure 18. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,466 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
3,44E-02	4,32E+00
8,31E-02	6,95E-01
2,22E-01	6,24E-02
1,02E-01	1,07E-02
2,50E-02	9,13E-04



Boost Sw. Inv. Diode Characteristics

figure 19. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

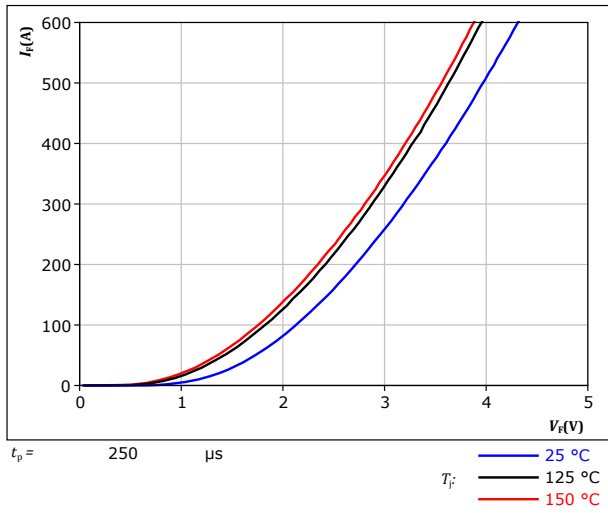
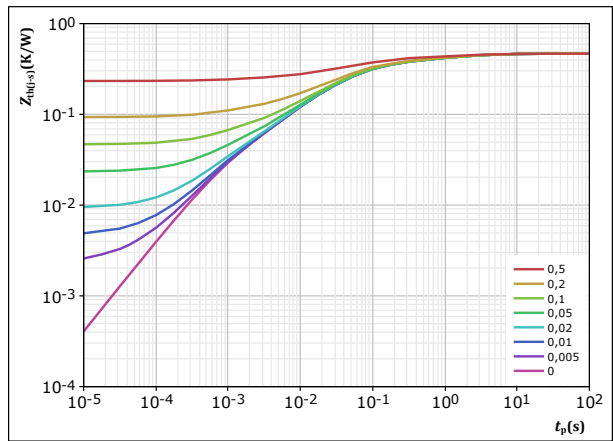


figure 20. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	0,466	K/W
FWD thermal model values		
R (K/W)	τ (s)	
3,44E-02	4,32E+00	
8,31E-02	6,95E-01	
2,22E-01	6,24E-02	
1,02E-01	1,07E-02	
2,50E-02	9,13E-04	



Boost Sw. Protection Diode Characteristics

figure 21. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

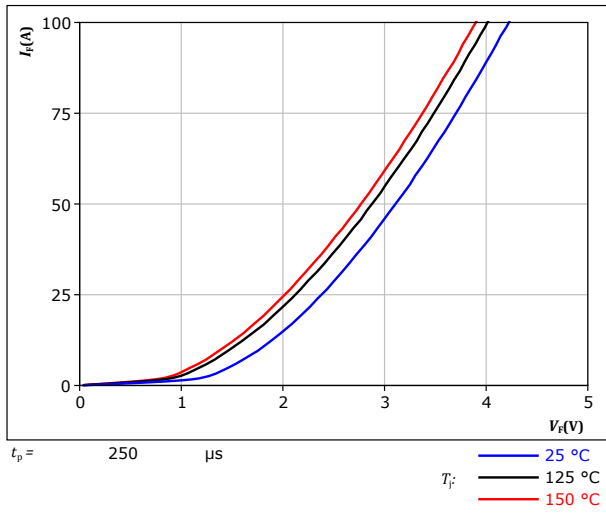
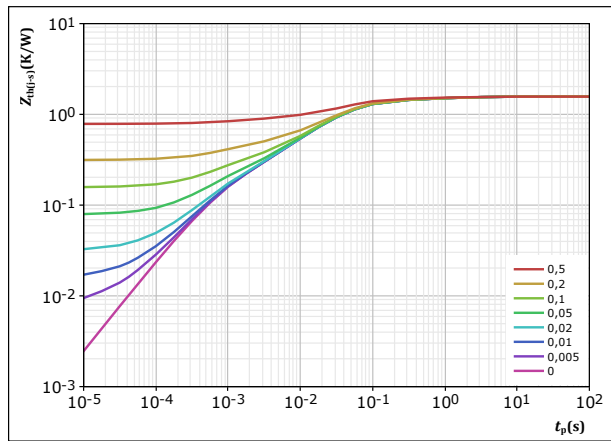


figure 22. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T	
$R_{th(j-s)} =$	1,569	K/W
FWD thermal model values		
R (K/W)	τ (s)	
1,01E-01	1,94E+00	
2,27E-01	1,82E-01	
9,16E-01	3,29E-02	
1,87E-01	6,19E-03	
1,39E-01	7,38E-04	



Boost D. Protection Diode Characteristics

figure 23. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

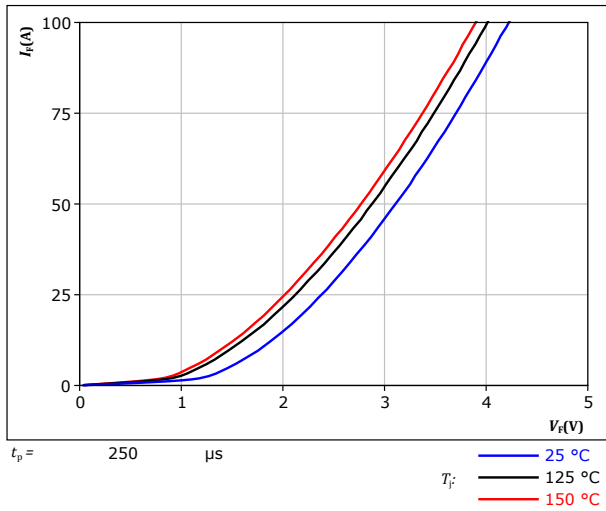
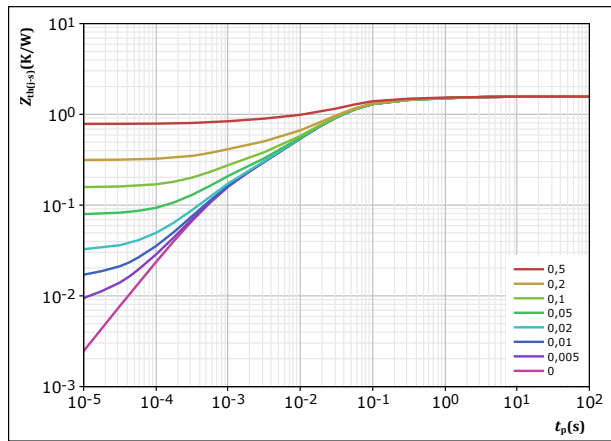


figure 24. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 1,569 \text{ K/W}$
 FWD thermal model values

R (K/W)	τ (s)
1,01E-01	1,94E+00
2,27E-01	1,82E-01
9,16E-01	3,29E-02
1,87E-01	6,19E-03
1,39E-01	7,38E-04

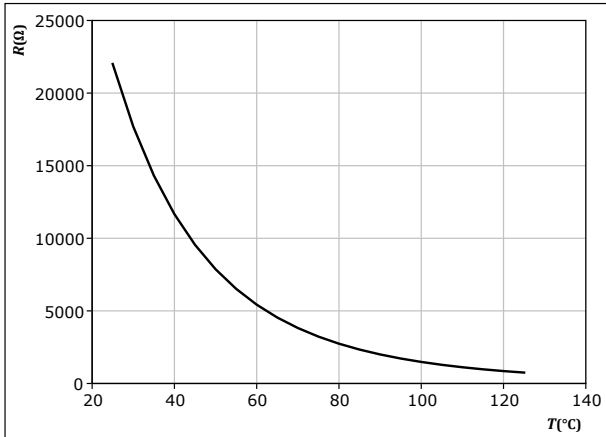


Thermistor Characteristics

figure 25. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$

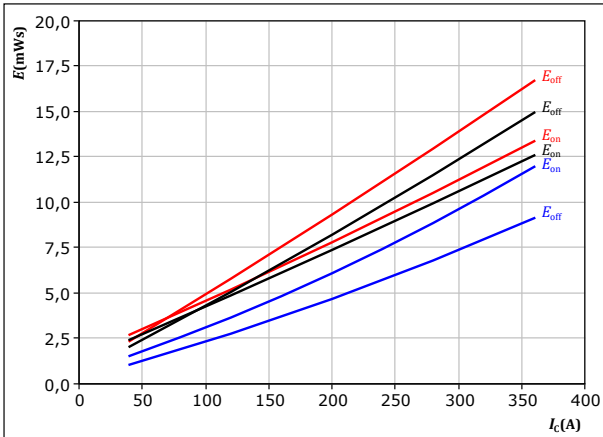




Buck Switching Characteristics

figure 26. IGBT

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

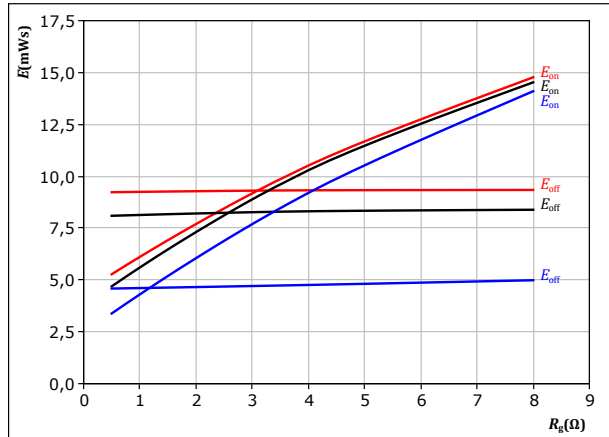


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$R_{g(on)} =$	2	Ω		—	150 °C
$R_{g(off)} =$	2	Ω			

figure 27. IGBT

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

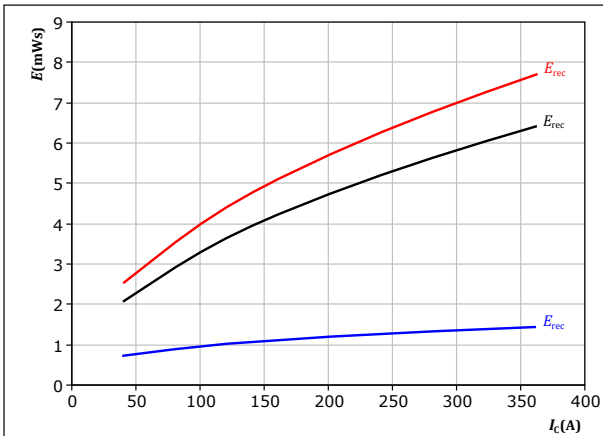


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$I_c =$	200	A		—	150 °C

figure 28. FWD

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

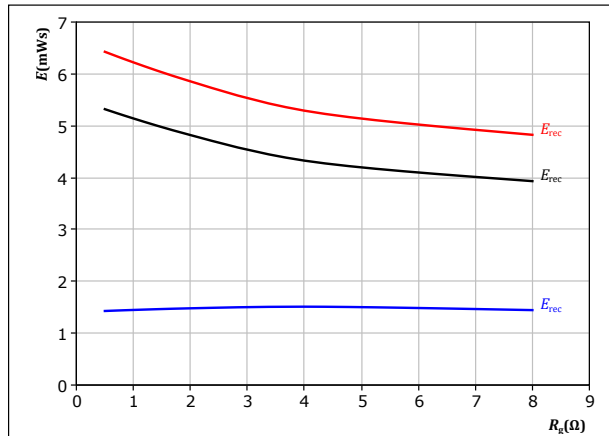


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$R_{g(on)} =$	2	Ω		—	150 °C

figure 29. 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

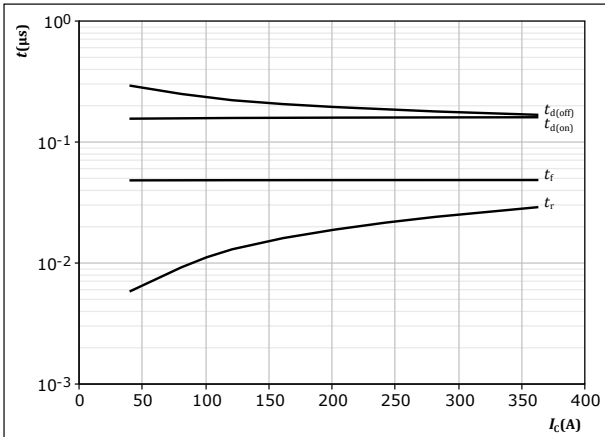
$V_{CE} =$	600	V	$T_j:$	—	25 °C
$V_{GE} =$	±15	V		—	125 °C
$I_c =$	200	A		—	150 °C



Buck Switching Characteristics

figure 30. IGBT

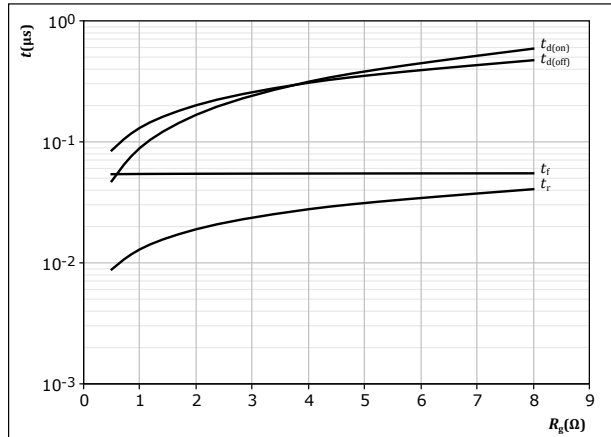
Typical switching times as a function of collector current
 $t = f(I_c)$



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 31. IGBT

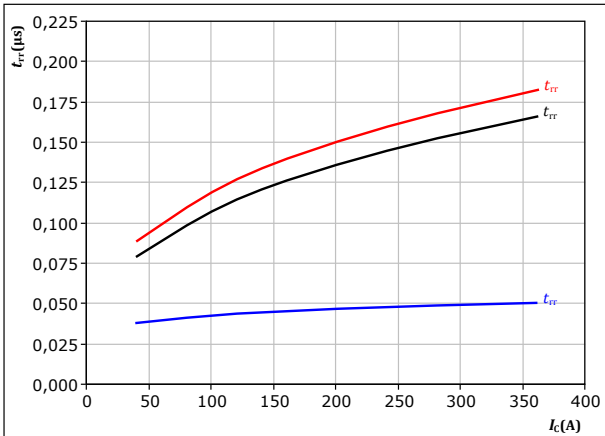
Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 200$ A

figure 32. FWD

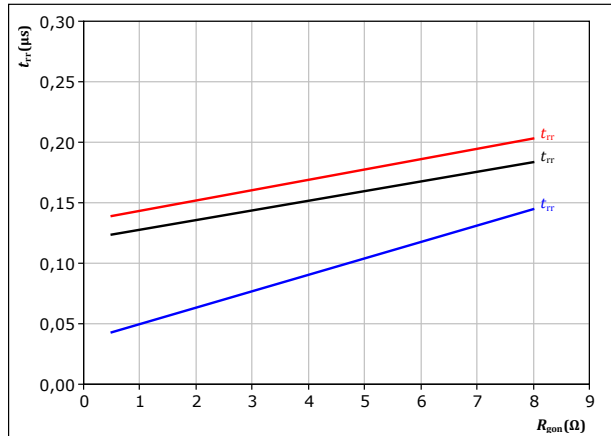
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



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 33. 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
 $I_c = 200$ A
 T_j : — 25 °C
— 125 °C
— 150 °C

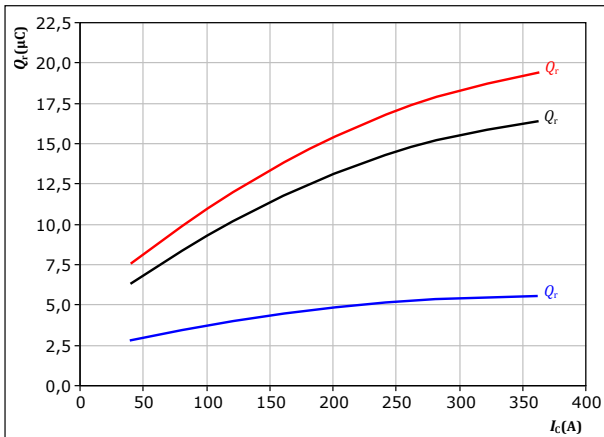


Buck Switching Characteristics

figure 34. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



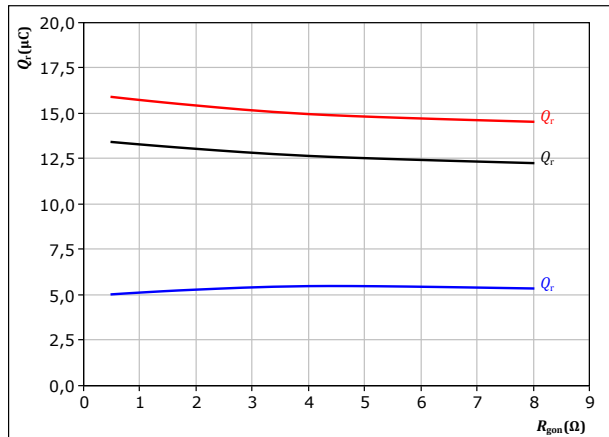
With an inductive load at

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

figure 35. FWD

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

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



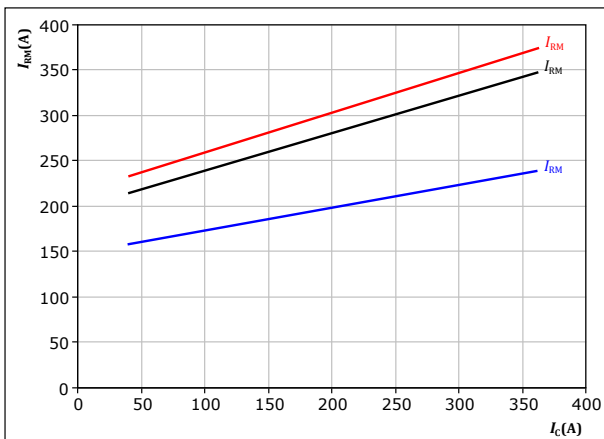
With an inductive load at

$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 200$ A
 $T_j:$ — 25 °C
 — 125 °C
 — 150 °C

figure 36. FWD

Typical peak reverse recovery current as a function of collector current

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



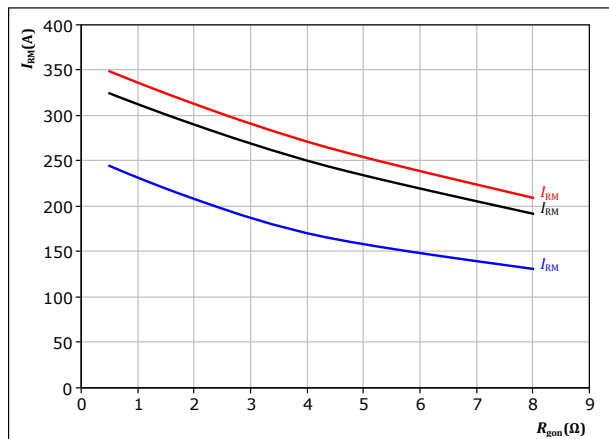
With an inductive load at

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

figure 37. 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

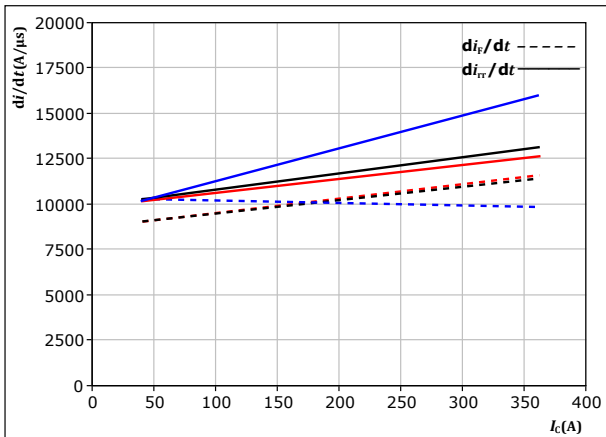
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 200$ A
 $T_j:$ — 25 °C
 — 125 °C
 — 150 °C



Buck Switching Characteristics

figure 38. FWD

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

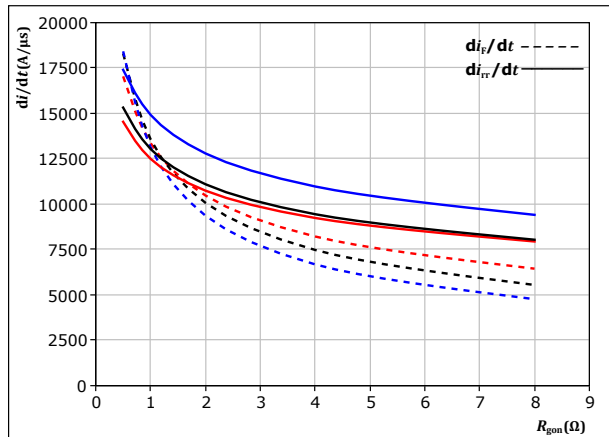


With an inductive load at

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

figure 39. FWD

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

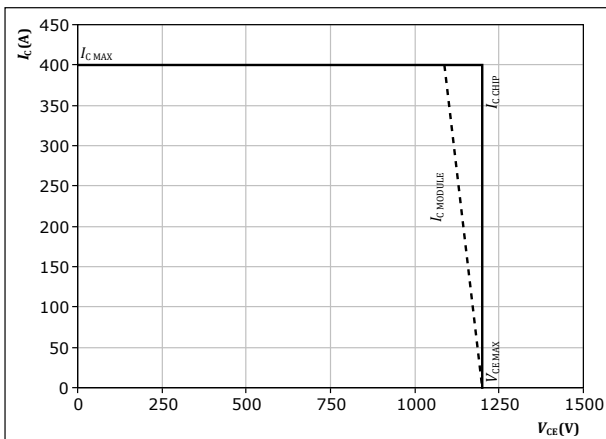


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	±15	V		125 °C
$I_C =$	200	A		150 °C

figure 40. IGBT

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



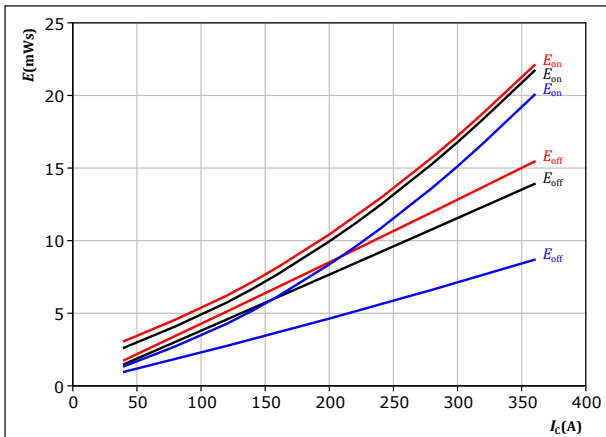
At $T_j = 150$ °C
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω



Boost Switching Characteristics

figure 41. IGBT

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

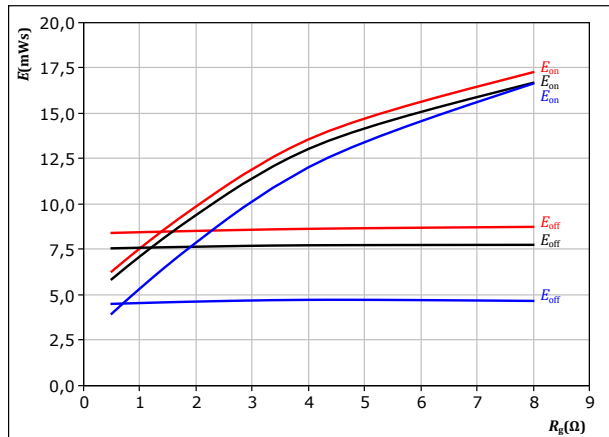


With an inductive load at

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

figure 42. IGBT

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

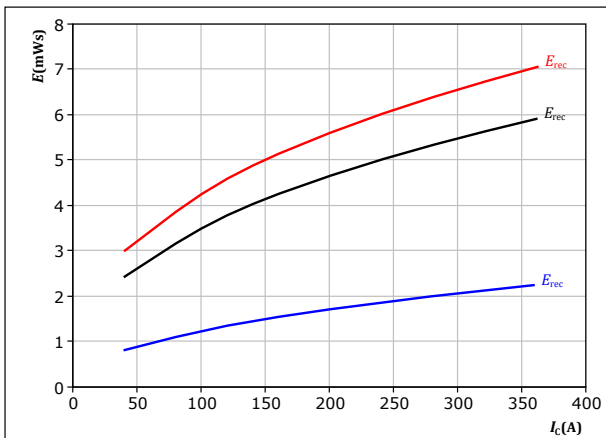


With an inductive load at

$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	±15	V		125 °C
$I_c =$	200	A		150 °C

figure 43. FWD

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

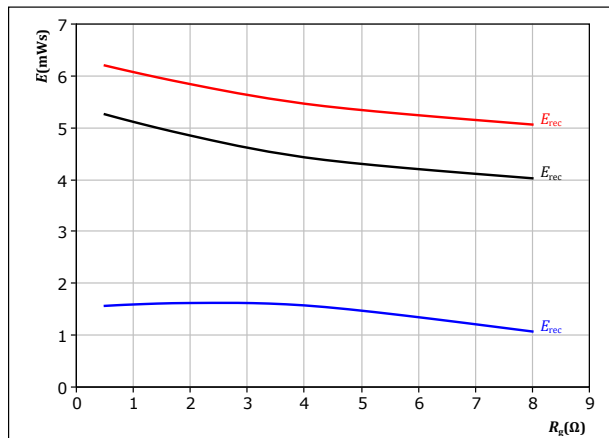


With an inductive load at

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

figure 44. 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

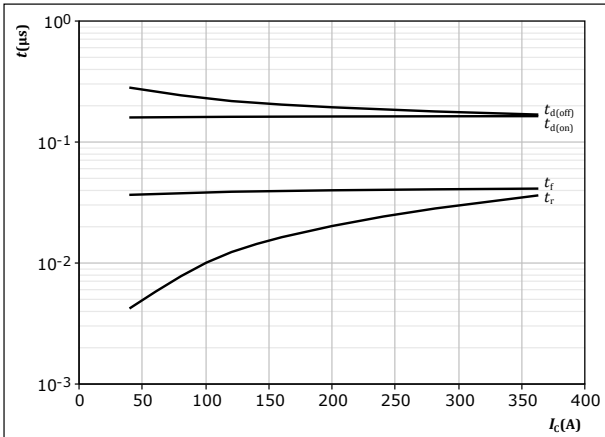
$V_{CE} =$	600	V	$T_j:$	25 °C
$V_{GE} =$	±15	V		125 °C
$I_c =$	200	A		150 °C



Boost Switching Characteristics

figure 45. IGBT

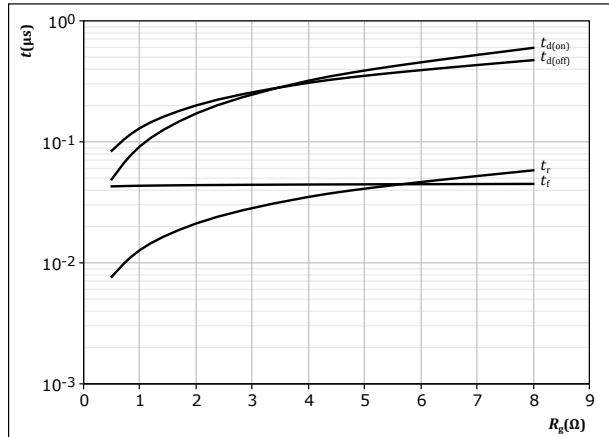
Typical switching times as a function of collector current
 $t = f(I_c)$



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 46. IGBT

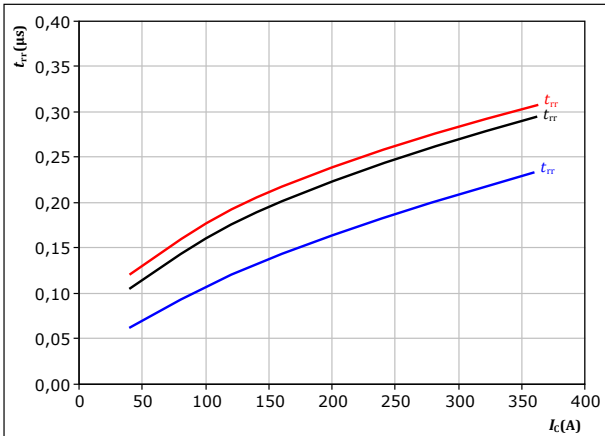
Typical switching times as a function of IGBT turn on gate resistor
 $t = f(R_g)$



With an inductive load at
 $T_j = 150 \text{ }^\circ\text{C}$
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 200 \text{ A}$

figure 47. FWD

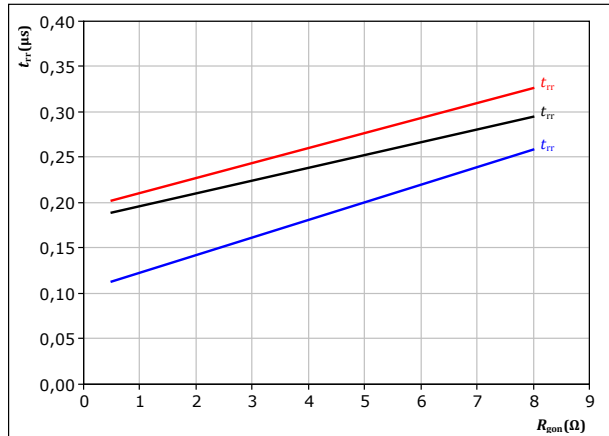
Typical reverse recovery time as a function of collector current
 $t_{rr} = f(I_c)$



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

figure 48. FWD

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



With an inductive load at
 $V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 200 \text{ A}$
 $T_j:$ — 25 °C
 — 125 °C
 — 150 °C

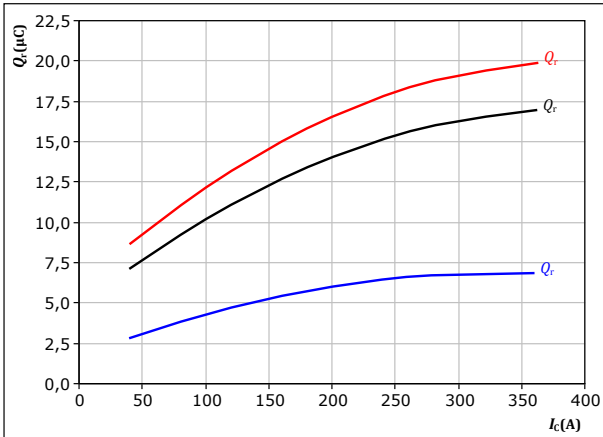


Boost Switching Characteristics

figure 49. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



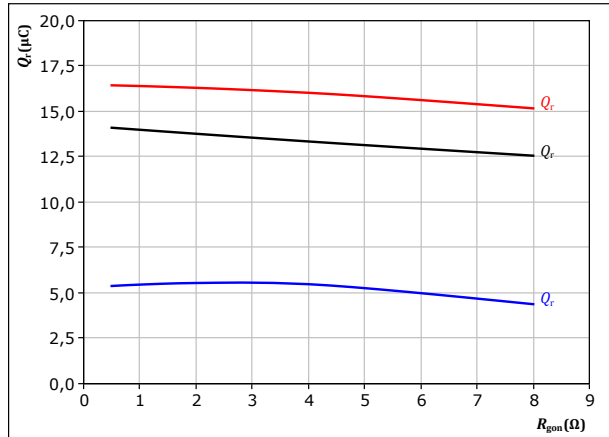
With an inductive load at

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

figure 50. FWD

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

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



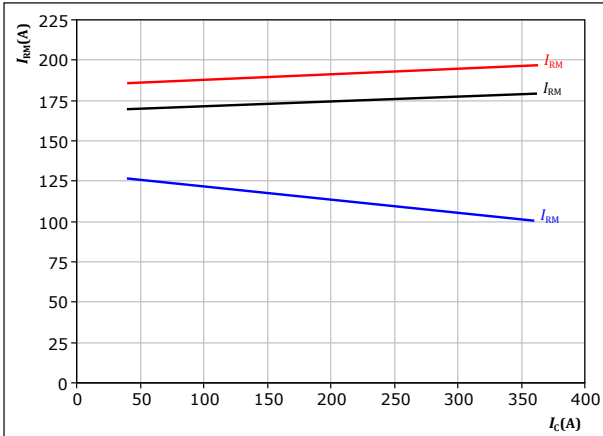
With an inductive load at

$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 200 \text{ A}$
 $T_j: 25 \text{ }^\circ\text{C}$
 $125 \text{ }^\circ\text{C}$
 $150 \text{ }^\circ\text{C}$

figure 51. FWD

Typical peak reverse recovery current as a function of collector current

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



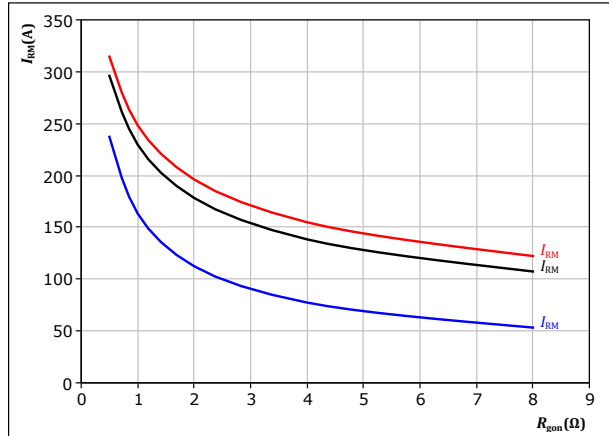
With an inductive load at

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

figure 52. 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

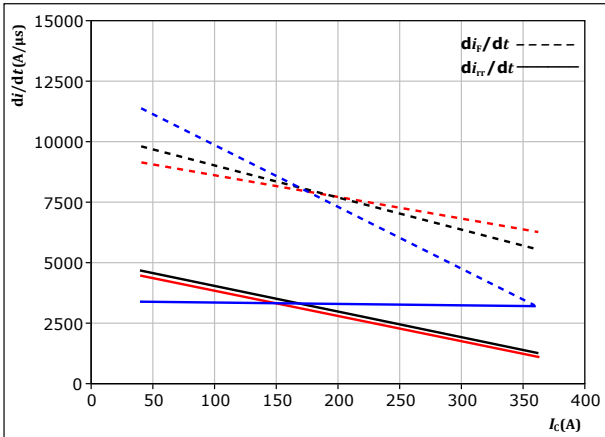
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 200 \text{ A}$
 $T_j: 25 \text{ }^\circ\text{C}$
 $125 \text{ }^\circ\text{C}$
 $150 \text{ }^\circ\text{C}$



Boost Switching Characteristics

figure 53. FWD

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



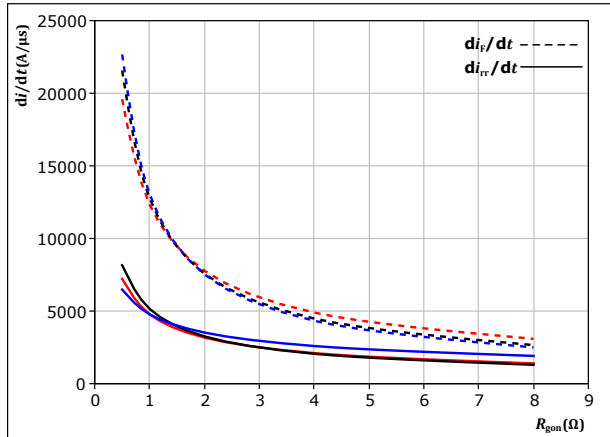
With an inductive load at

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

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 54. 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

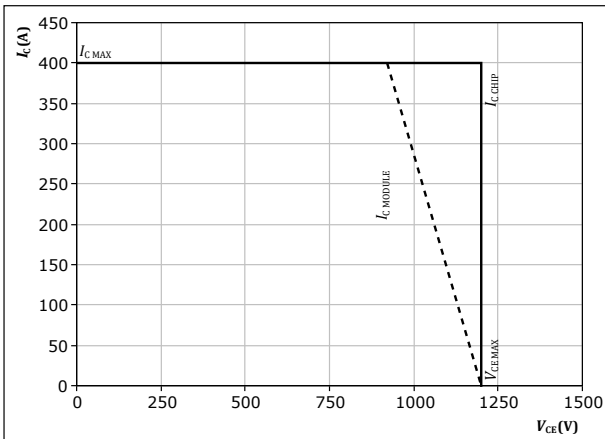
$V_{CE} = 600 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_c = 200 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 55. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



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



Switching Definitions

figure 56. IGBT

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

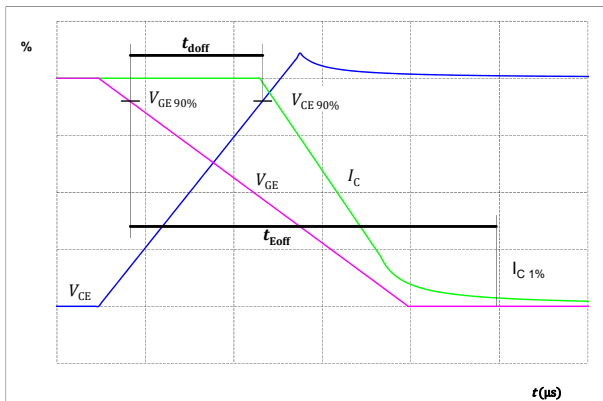


figure 57. IGBT

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

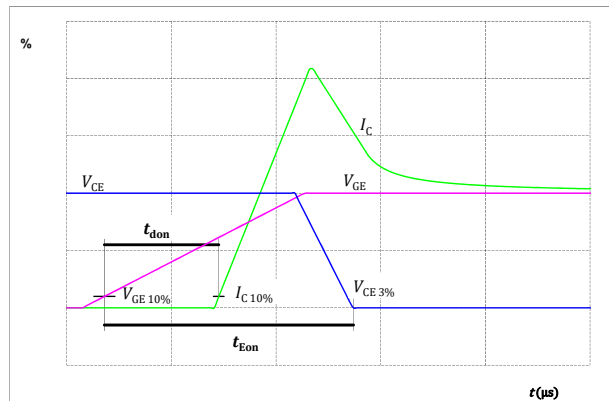


figure 58. IGBT

Turn-off Switching Waveforms & definition of t_f

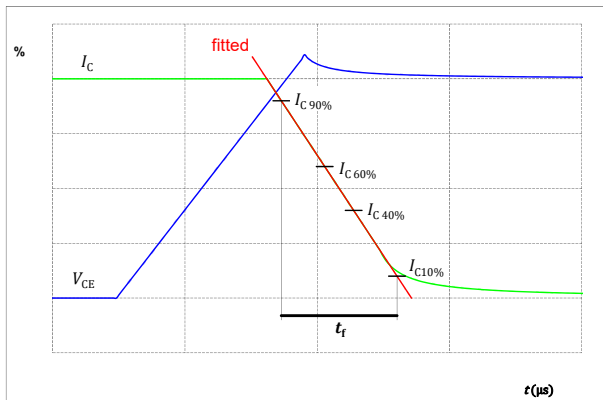
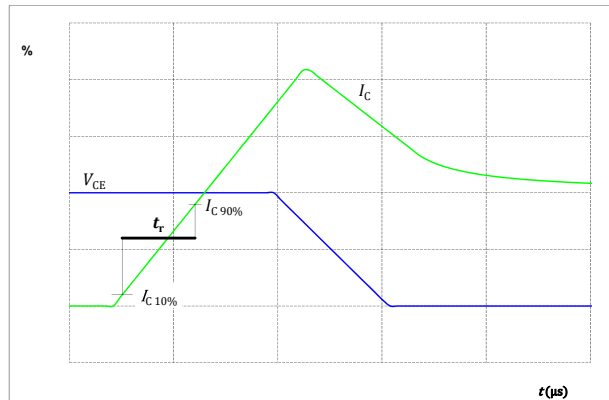


figure 59. IGBT

Turn-on Switching Waveforms & definition of t_r





Switching Definitions

figure 60. FWD

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

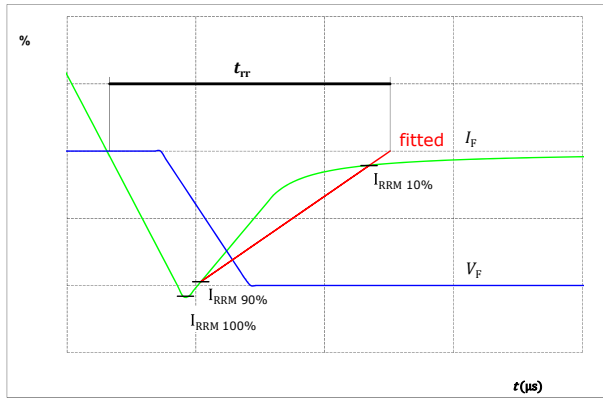
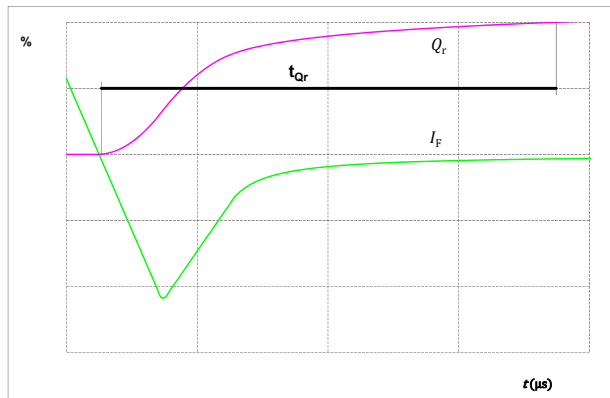


figure 61. FWD

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




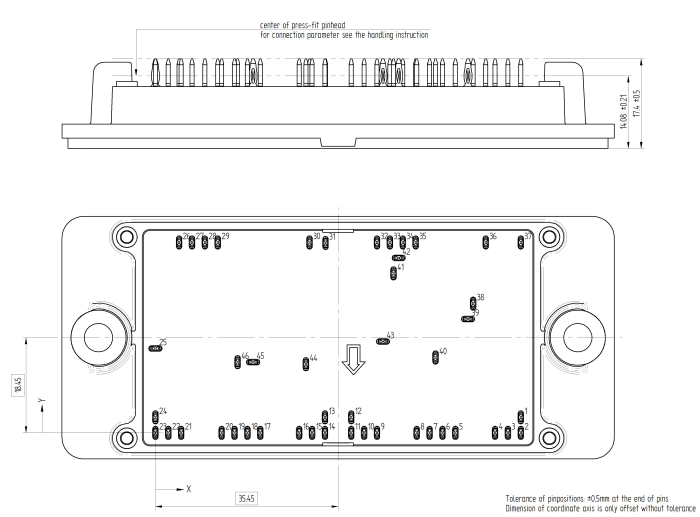


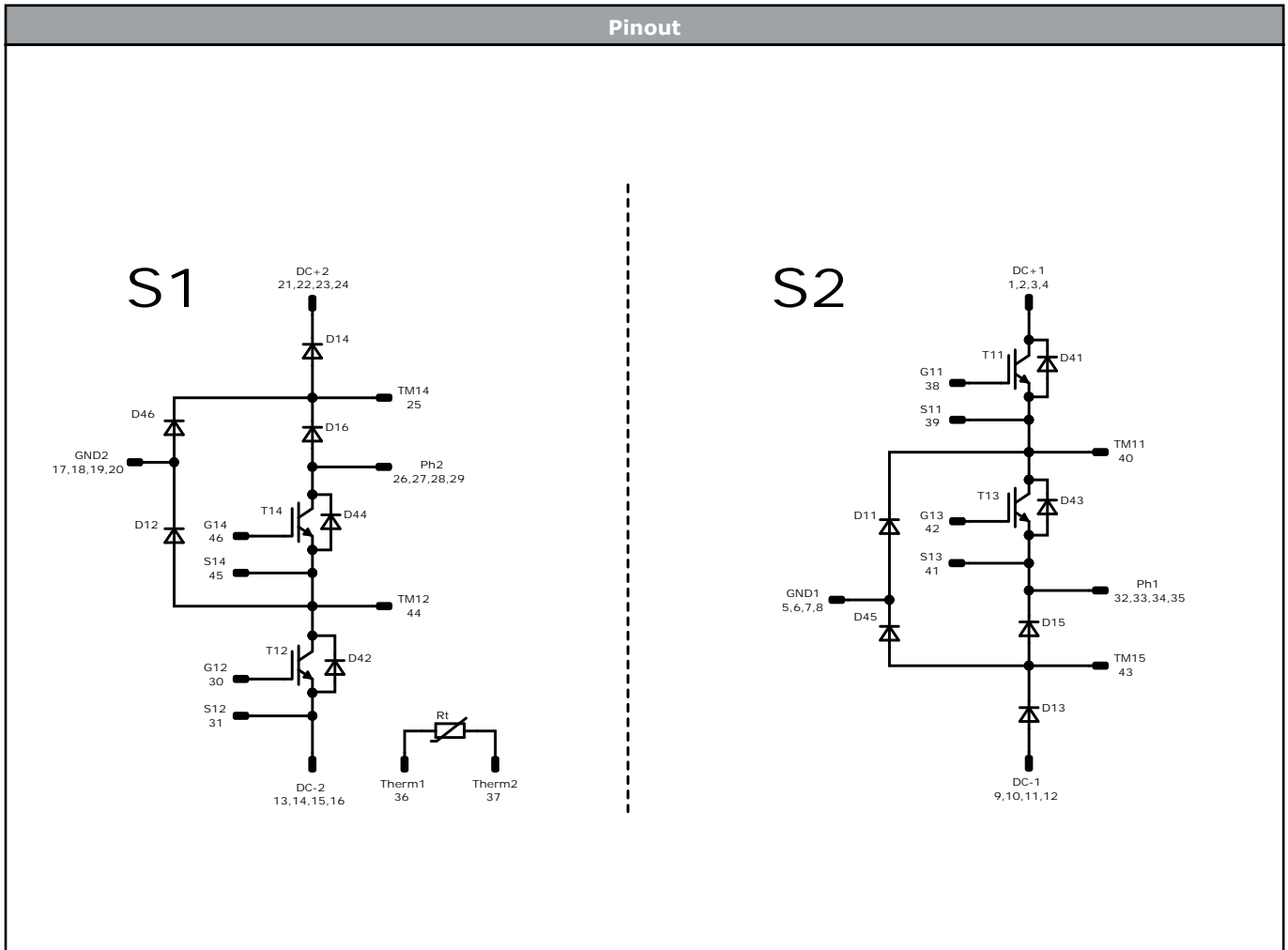
Vincotech

30-PT12NIA200H7-LG00F18Y
datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	30-PT12NIA200H7-LG00F18Y
With thermal paste (3,4 W/mK, PSX-P7)	30-PT12NIA200H7-LG00F18Y-/3/

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

Pin table [mm]				Outline	
Pin	X	Y	Function		
1	70,9	3	DC+1	 <p>center of press-fit pinhead for connection parameter see the handling instruction</p> <p>19,8 ± 0,12 17 ± 0,15</p> <p>18,45 35,45</p> <p>Tolerance of positions: ±0,05mm at the end of pins Dimension of coordinate axis is only offset without tolerance</p>	
2	70,9	0	DC+1		
3	68,4	0	DC+1		
4	65,9	0	DC+1		
5	58,2	0	GND1		
6	55,7	0	GND1		
7	53,2	0	GND1		
8	50,7	0	GND1		
9	43	0	DC-1		
10	40,5	0	DC-1		
11	38	0	DC-1		
12	38	3	DC-1		
13	32,9	3	DC-2		
14	32,9	0	DC-2		
15	30,4	0	DC-2		
16	27,9	0	DC-2		
17	20,35	0	GND2		
18	17,85	0	GND2		
19	15,35	0	GND2		
20	12,85	0	GND2		
21	5	0	DC+2		
22	2,5	0	DC+2		
23	0	0	DC+2		
24	0	3	DC+2		
25	0	16,35	TM14		
26	4,6	36,9	Ph2		
27	7,1	36,9	Ph2		
28	9,6	36,9	Ph2		
29	12,1	36,9	Ph2		
30	29,9	36,9	G12		
31	33	36,8	S12		
32	43	36,9	Ph1		
33	45,5	36,9	Ph1		
34	48	36,9	Ph1		
35	50,5	36,9	Ph1		
36	64,1	36,9	Therm1		
37	70,9	36,9	Therm2		
38	61,65	25,05	G11		
39	60,65	22,05	S11		
40	54,35	14,6	TM11		
41	46,2	30,9	S13		
42	47,2	33,9	G13		
43	44,15	17,7	TM15		
44	29,2	13,3	TM12		
45	18,95	13,7	S14		
46	15,95	13,7	G14		



Identification					
ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	200 A	Buck Switch	
D11, D12	FWD	1200 V	200 A	Buck Diode	
D41, D42	FWD	1200 V	100 A	Buck Sw. Protection Diode	
T13, T14	IGBT	1200 V	200 A	Boost Switch	
D13, D14	FWD	1200 V	200 A	Boost Diode	
D15, D16	FWD	1200 V	200 A	Boost Sw. Inv. Diode	
D43, D44	FWD	1200 V	40 A	Boost Sw. Protection Diode	
D45, D46	FWD	1200 V	40 A	Boost D. Protection Diode	
Rt	Thermistor			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.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}=175^{\circ}C$ and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.



Document No.:	Date:	Modification:	Pages
30-PT12NIA200H7-LG00F18Y-D2-14	4 Mar. 2024	Updated Isolation Voltage	

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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.