



Vincotech

30-E312NMA300H7-PM18F07Z

datasheet

flowMNPC E3BP

1200 V / 300 A

Topology features

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

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: Al_2O_3
- Cu baseplate
- Convex shaped baseplate for superior thermal contact
- CTI600 housing material
- Baseplate with rough surface
- Thermo-mechanical push-and-pull force relief
- Solder pin

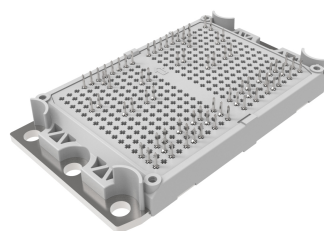
Target applications

- Energy Storage Systems
- Solar Inverters
- UPS

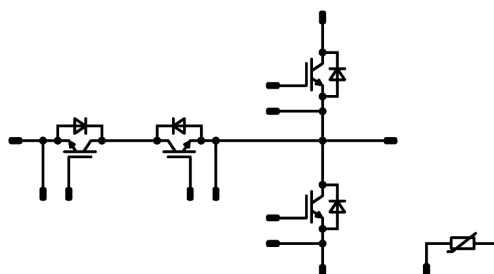
Types

- 30-E312NMA300H7-PM18F07Z

flow E3BP 12 mm housing



Schematic





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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
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Buck Switch

Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	250	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	900	A
Turn off safe operating area		$T_j = 150\text{ °C}$, $V_{CE} = 1200\text{ V}$	900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	538	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C

Buck Diode

Peak repetitive reverse voltage	V_{RRM}		650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	271	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	960	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	410	W
Maximum junction temperature	T_{jmax}		175	°C

Boost Switch

Collector-emitter voltage	V_{CES}		650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	294	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}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	431	W
Gate-emitter voltage	V_{GES}		± 20	V
Maximum junction temperature	T_{jmax}		175	°C



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Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	197	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	1200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	395	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* $t_p = 2\text{ s}$	6000	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production



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Characteristic Values

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

Buck Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0048	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		300	25 125 150		1,86 2,16 2,22	2,15 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			16	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	$f = 100 \text{ kHz}$	0	25		25		38400		pF
Output capacitance	C_{oes}							736		pF
Reverse transfer capacitance	C_{res}							216		pF
Gate charge	Q_g	$V_{CC} = 960 \text{ V}$	0/15		300	25		2200		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,18		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \text{ } \Omega$ $R_{goff} = 4 \text{ } \Omega$	± 15	350	300	25 125 150		249,87 250,73 251,36		ns
Rise time	t_r					25 125 150		25,98 29,25 30,24		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		203,53 230,33 236,98		ns
Fall time	t_f					25 125 150		39,34 65,8 71,17		ns
Turn-on energy (per pulse)	E_{on}	$Q_{tFWD} = 6,1 \text{ } \mu\text{C}$ $Q_{tFWD} = 13,83 \text{ } \mu\text{C}$ $Q_{tFWD} = 15,87 \text{ } \mu\text{C}$				25 125 150		6,43 7,03 7,44		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		6,5 10,87 12,13		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				320	25 125 150		1,83 1,69 1,66	1,92 ⁽¹⁾	V
Reverse leakage current	I_R	$V_r = 650$ V				25			16,8	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,23		K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=10800$ A/µs $di/dt=9817$ A/µs $di/dt=10896$ A/µs	± 15	350	300	25 125 150		150,06 255,7 276,4		A
Reverse recovery time	t_{rr}					25 125 150		70,65 93,05 103,73		ns
Recovered charge	Q_r					25 125 150		6,1 13,83 15,87		µC
Reverse recovered energy	E_{rec}					25 125 150		1,04 2,83 3,3		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		2971,52 4310,5 3992,7		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		

Boost Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,003	25	3,25	4	4,75	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		300	25 125 150	1,15	1,31 1,41 1,44	1,8 ⁽¹⁾	V
Collector-emitter cut-off current	I_{CES}		0	650		25			76	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	25		25		16240		pF
Output capacitance	C_{oes}							480		pF
Reverse transfer capacitance	C_{res}							58,4		pF
Gate charge	Q_g	$V_{CC} = 400 \text{ V}$	±15		300	25		1220		nC

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2 \text{ W/mK}$ (PTM)						0,22		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \text{ } \Omega$ $R_{goff} = 4 \text{ } \Omega$	±15	350	300	25 125 150		82,57 84 83,81		ns
Rise time	t_r					25 125 150		17,39 20,04 20,66		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		83,52 99,23 103,46		ns
Fall time	t_f					25 125 150		16,96 26,79 32,31		ns
Turn-on energy (per pulse)	E_{on}					25 125 150		2,77 3,68 4,18		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,82 6,11 6,45		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				400	25 125 150		3,11 2,96 2,88	3 ⁽¹⁾	V
Reverse leakage current	I_R	$V_i = 1200$ V				25			16	µA

Thermal

Thermal resistance junction to sink ⁽²⁾	$R_{th(j-s)}$	$\lambda_{paste} = 5,2$ W/mK (PTM)						0,24		K/W
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Dynamic

Peak recovery current	I_{RM}	$di/dt=15462$ A/µs $di/dt=13463$ A/µs $di/dt=13358$ A/µs	± 15	350	300	25 125 150		295,05 394,01 421,45		A
Reverse recovery time	t_{rr}					25 125 150		39,8 59,17 65,98		ns
Recovered charge	Q_r					25 125 150		6,43 13,39 15,91		µC
Reverse recovered energy	E_{rec}					25 125 150		1,31 2,87 3,42		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		24193,56 17673,05 17166,87		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	

Thermistor

Static

Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	$R_{100} = 1484 \Omega$				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.



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Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

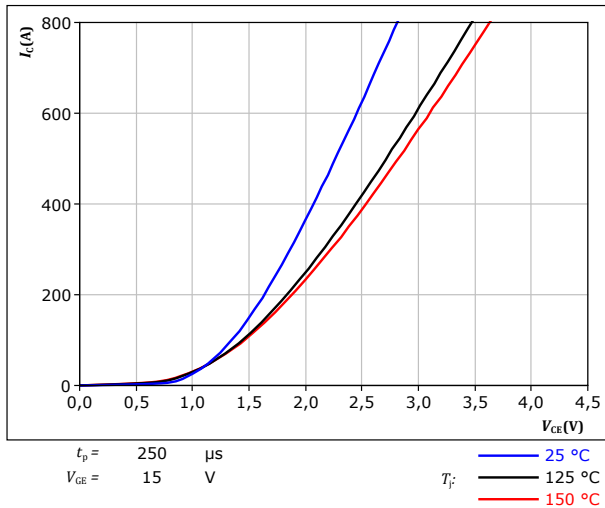


figure 2. IGBT

Typical output characteristics

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

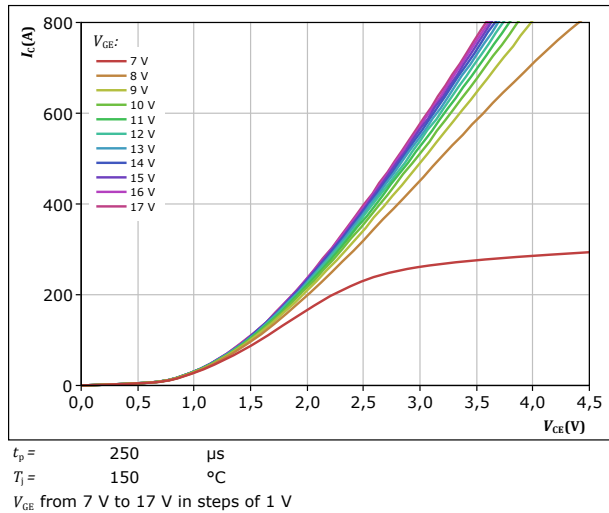


figure 3. IGBT

Typical transfer characteristics

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

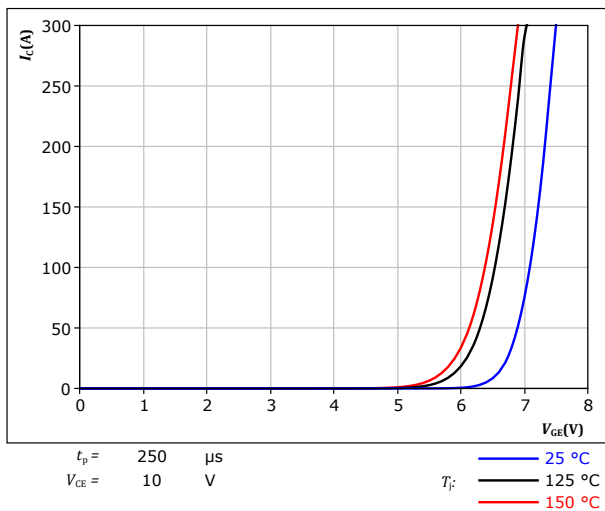
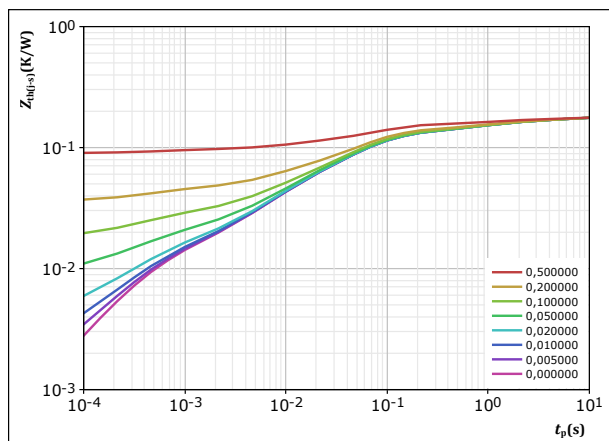


figure 4. IGBT

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)
2,26E-02	4,90E+00
3,07E-02	7,24E-01
9,12E-02	5,74E-02
2,42E-02	7,81E-03
1,06E-02	4,06E-04



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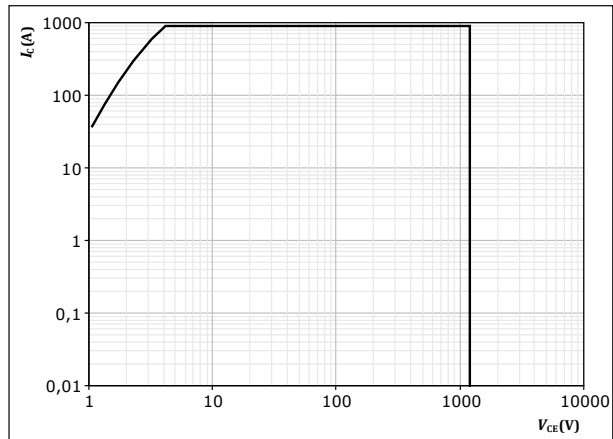
datasheet

Buck Switch Characteristics

figure 5. IGBT

Safe operating area

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

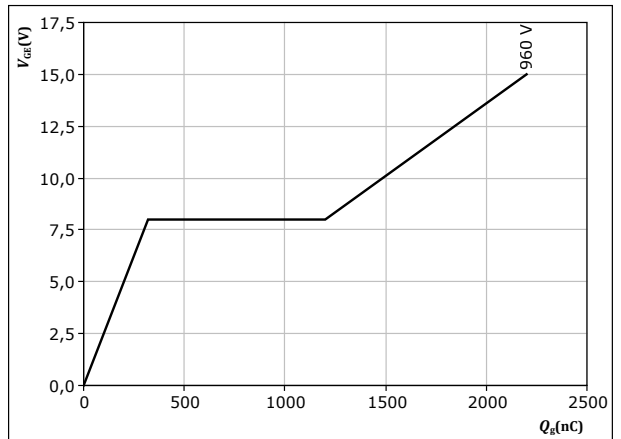


$D =$ single pulse
 $T_s = 80 \text{ } ^\circ\text{C}$
 $V_{GE} = 15 \text{ V}$
 $T_j = T_{jmax}$

figure 6. IGBT

Gate voltage vs gate charge

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



$I_C = 300 \text{ A}$
 $T_j = 25 \text{ } ^\circ\text{C}$



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Buck Diode Characteristics

figure 7.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

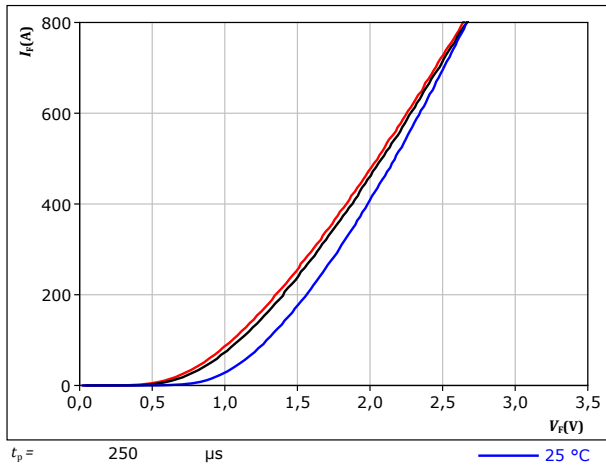
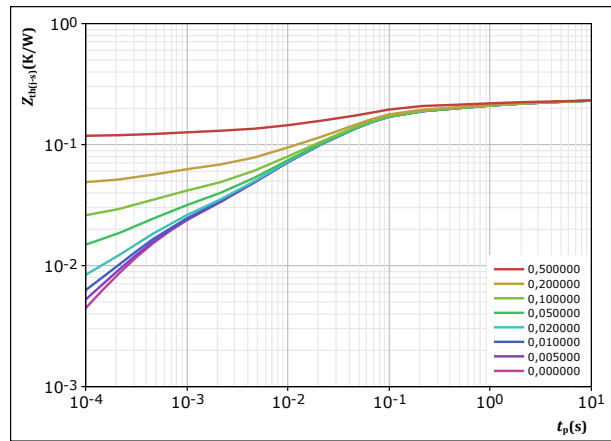


figure 8.

FWD

Transient thermal impedance as a function of pulse width

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





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Boost Switch Characteristics

figure 9. IGBT

Typical output characteristics

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

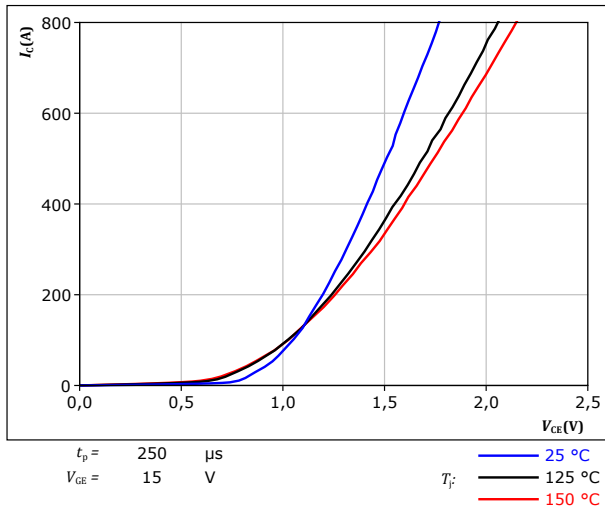


figure 10. IGBT

Typical output characteristics

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

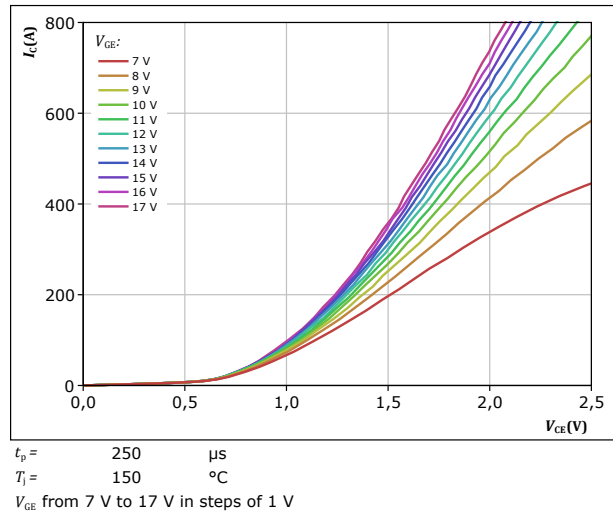


figure 11. IGBT

Typical transfer characteristics

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

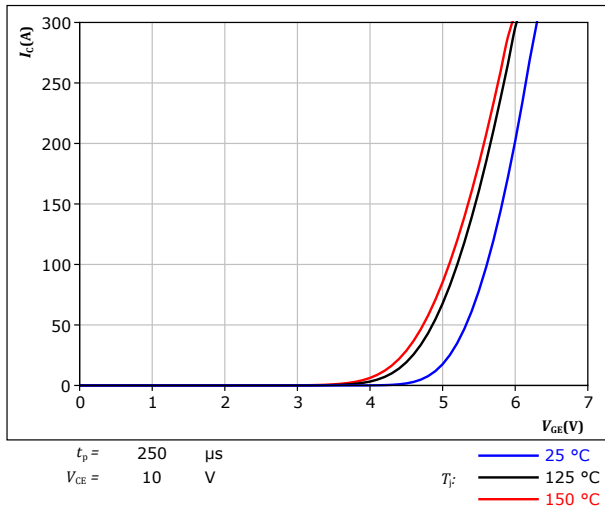
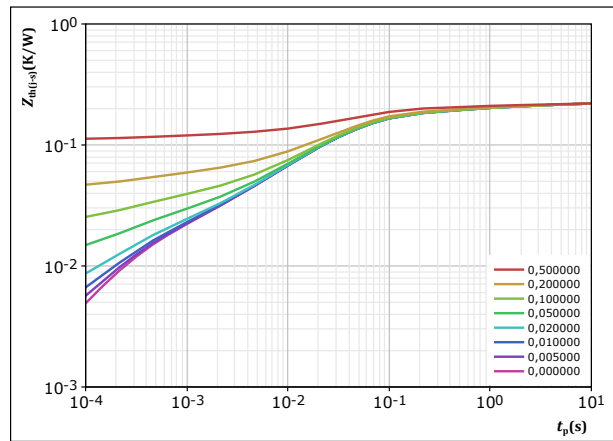


figure 12. IGBT

Transient thermal impedance as a function of pulse width

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



IGBT thermal model values	
R (K/W)	τ (s)
9.44E-04	9.28E+01
2.19E-02	3.67E+00
2.76E-02	3.95E-01
1.11E-01	4.65E-02
4.00E-02	1.07E-02
9.55E-03	1.35E-03
1.15E-02	2.64E-04



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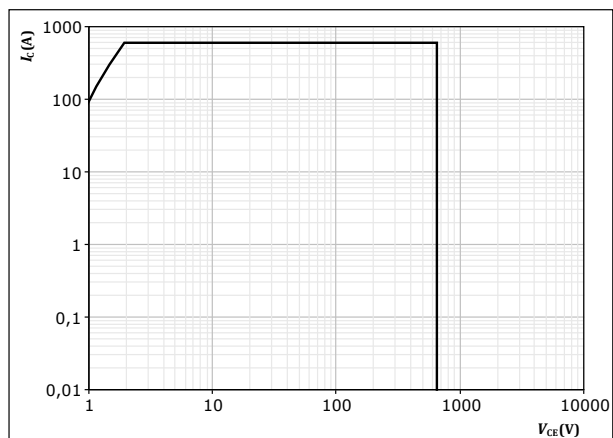
Boost Switch Characteristics

figure 13.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$

$V_{GE} = 15 \text{ V}$

$T_j = T_{jmax}$



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Boost Diode Characteristics

figure 14. FWD

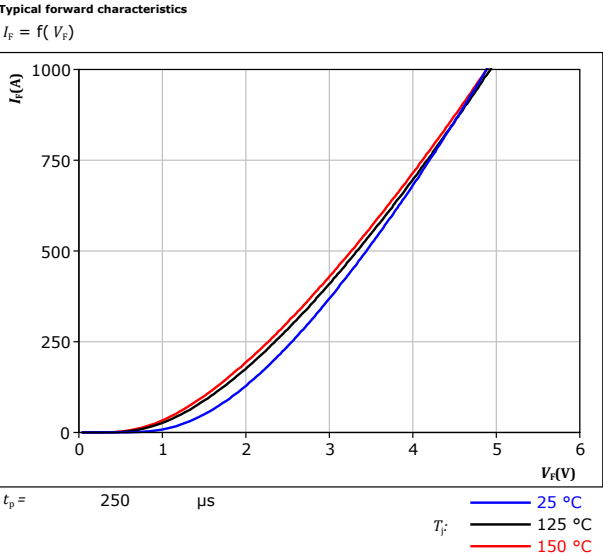
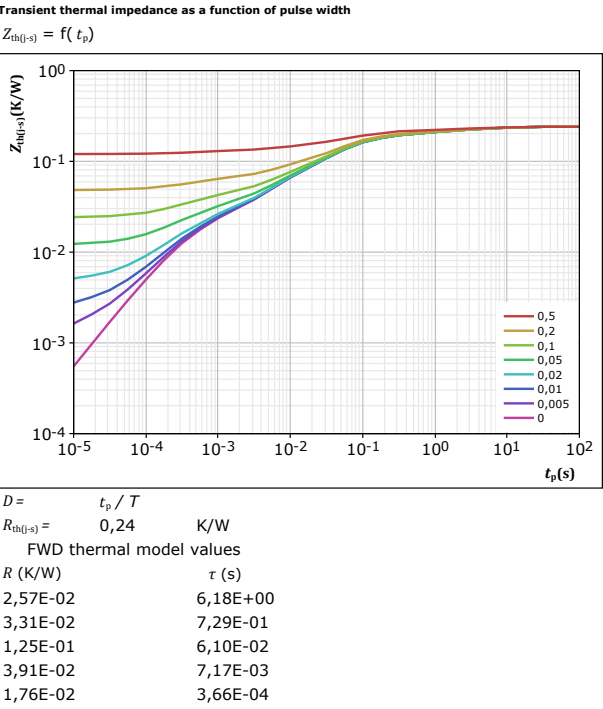


figure 15. FWD





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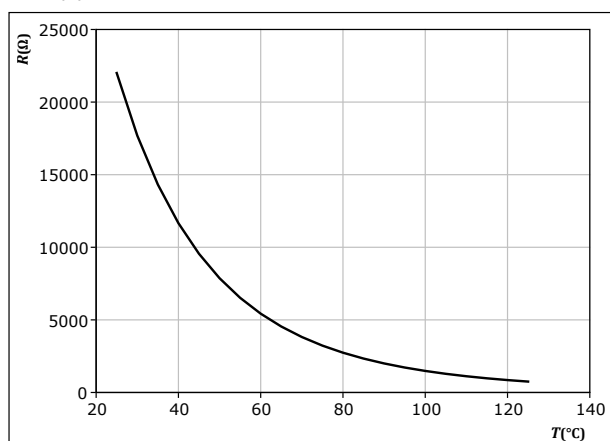
Thermistor Characteristics

figure 16.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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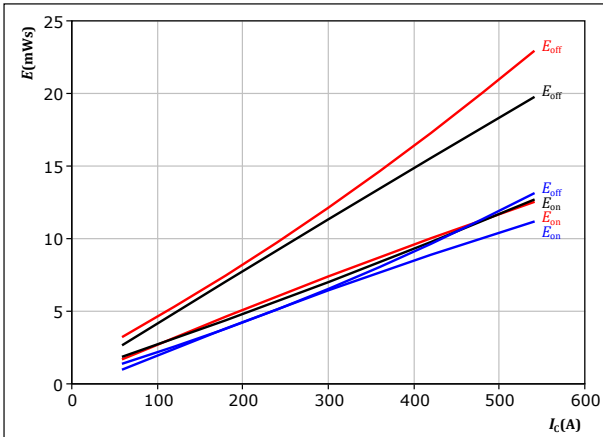
Buck Switching Characteristics

figure 17.

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
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

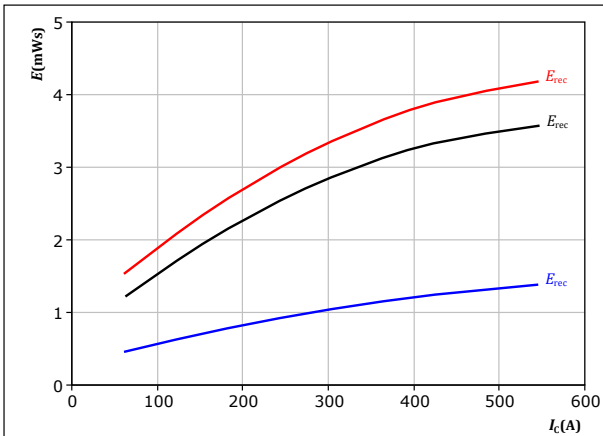
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 19.

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
 $R_{gon} = 4$ Ω

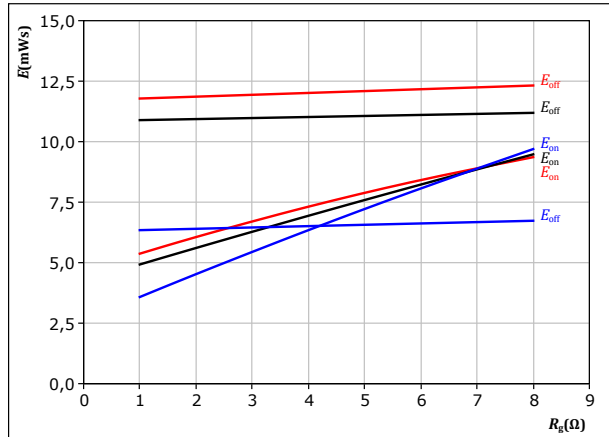
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 18.

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
 $I_c = 300$ A

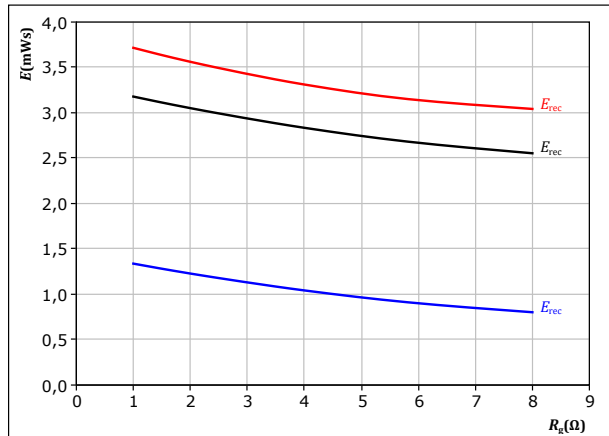
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 20.

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
 $I_c = 300$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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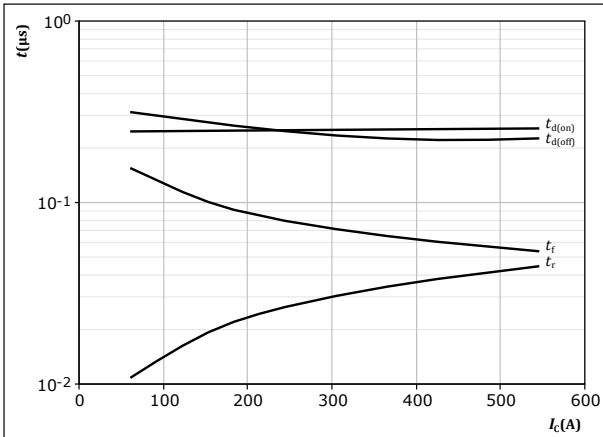
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datasheet

Buck Switching Characteristics

figure 21.

IGBT

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



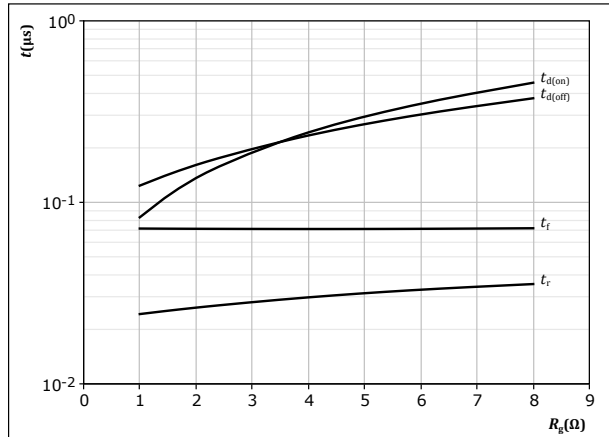
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 22.

IGBT

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



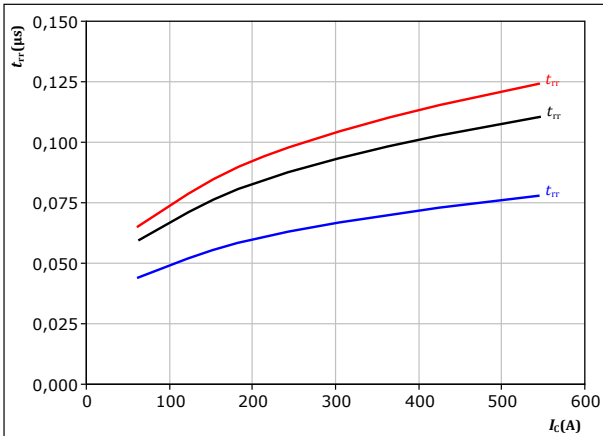
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_C = 300$ A

figure 23.

FWD

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



With an inductive load at

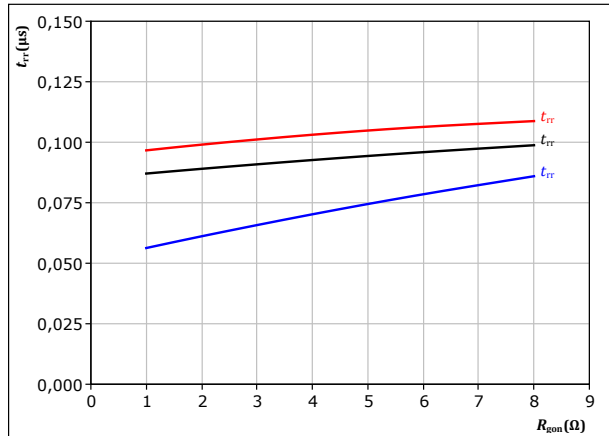
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 24.

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
 $I_C = 300$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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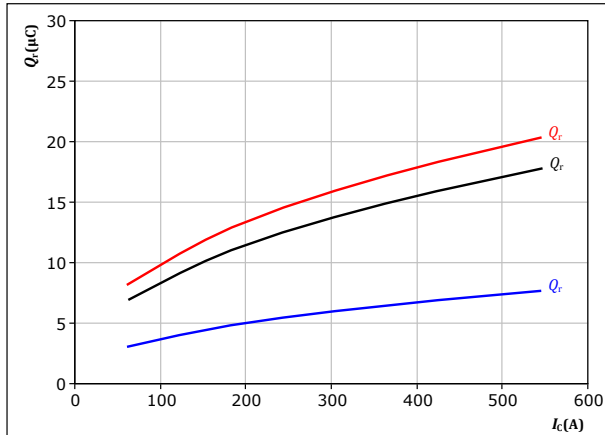
Buck Switching Characteristics

figure 25.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

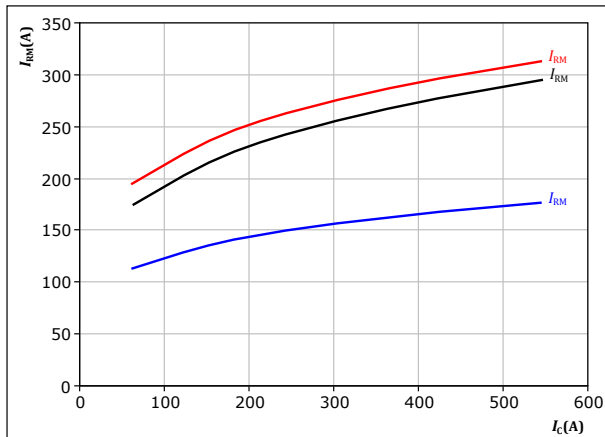
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 27.

FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

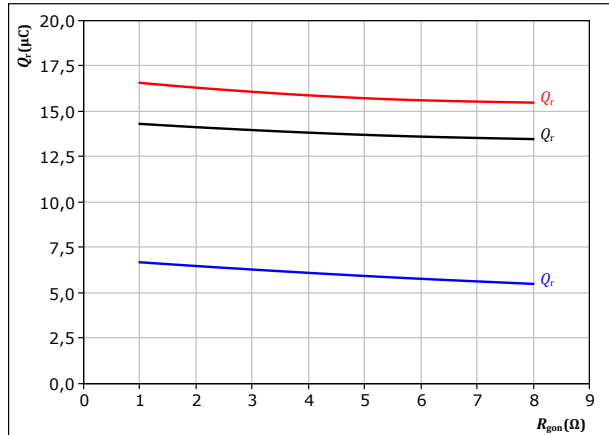
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 26.

FWD

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

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



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 300$ A

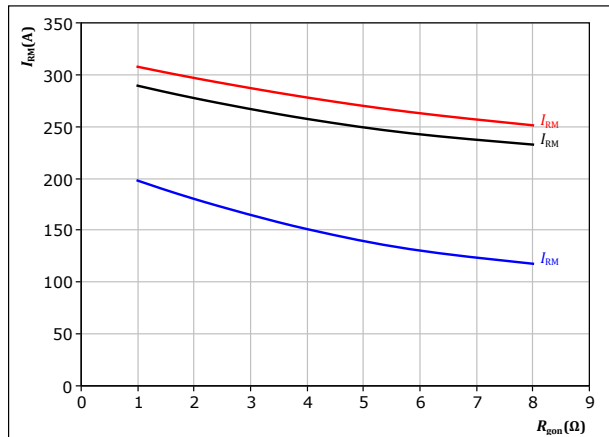
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 28.

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

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 300$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



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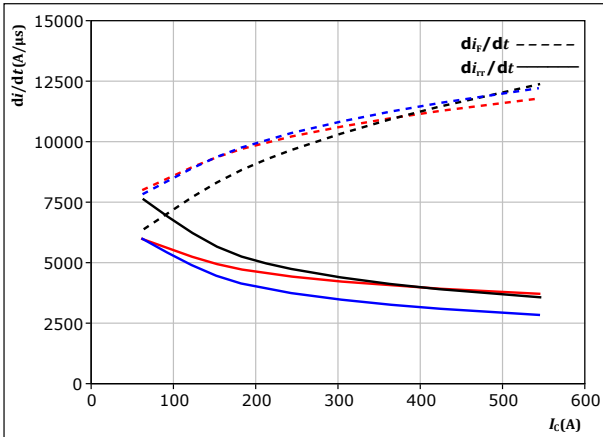
30-E312NMA300H7-PM18F07Z
datasheet

Buck Switching Characteristics

figure 29.

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

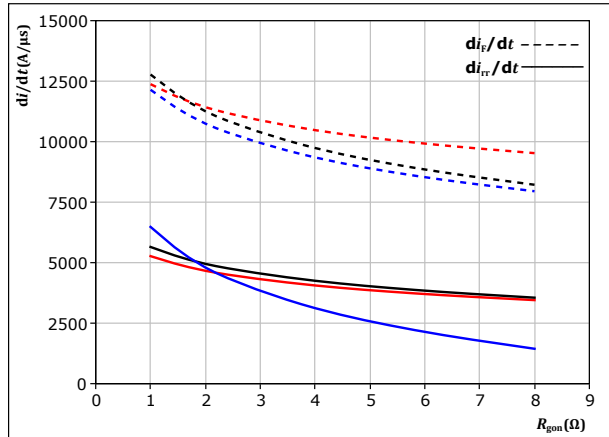
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 30.

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
 $V_{GE} = \pm 15$ V
 $I_C = 300$ A

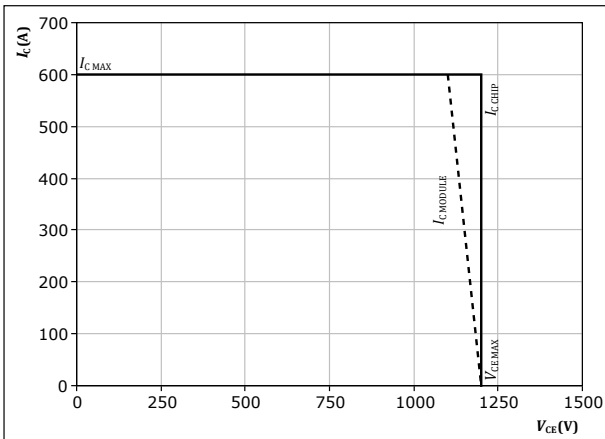
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 31.

IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



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



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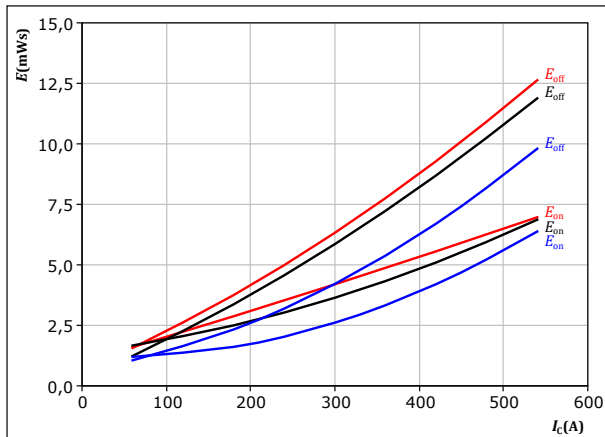
Boost Switching Characteristics

figure 32.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$
 $R_{goff} = 4 \text{ } \Omega$

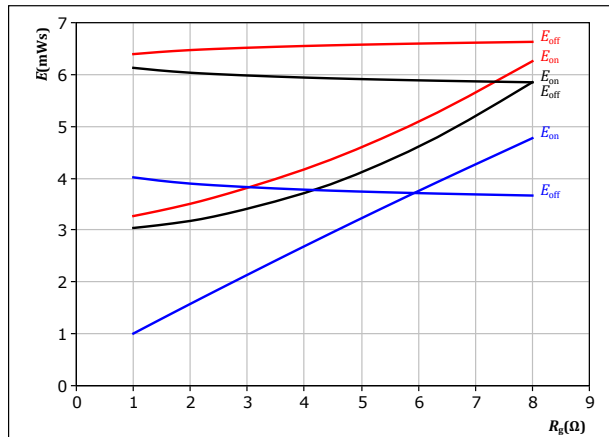
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 33.

IGBT

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

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 300 \text{ A}$

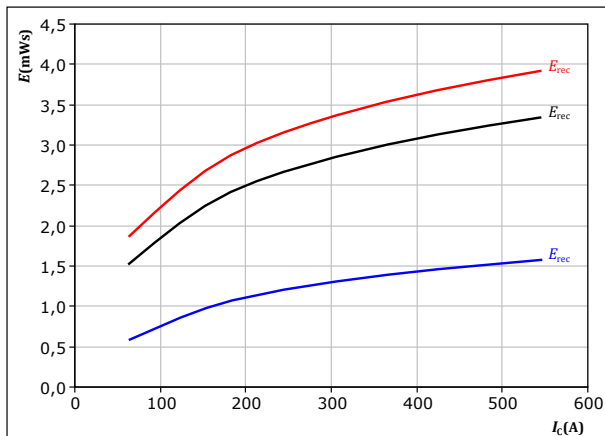
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 34.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $R_{gon} = 4 \text{ } \Omega$

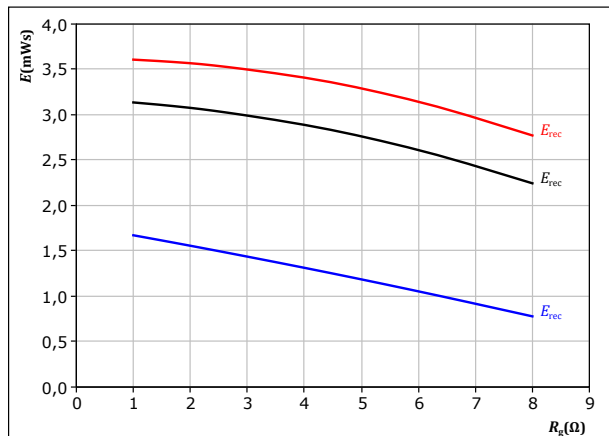
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 35.

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

$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 300 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C



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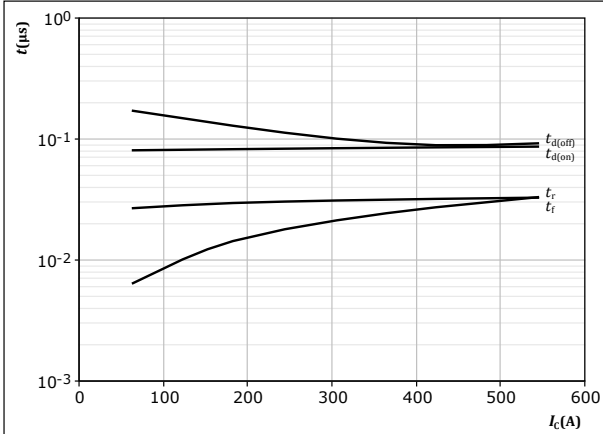
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datasheet

Boost Switching Characteristics

figure 36.

IGBT

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



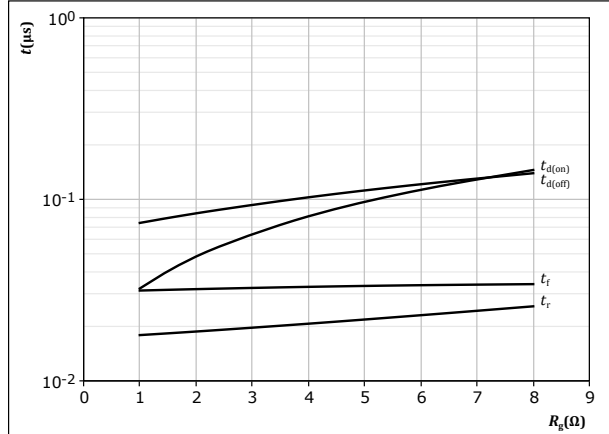
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 37.

IGBT

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



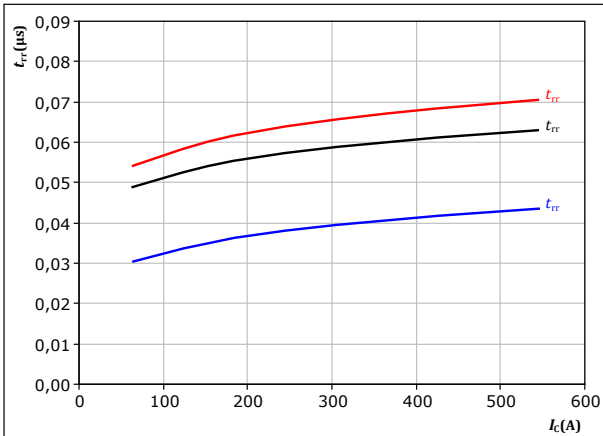
With an inductive load at

$T_j = 150$ °C
 $V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_C = 300$ A

figure 38.

FWD

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



With an inductive load at

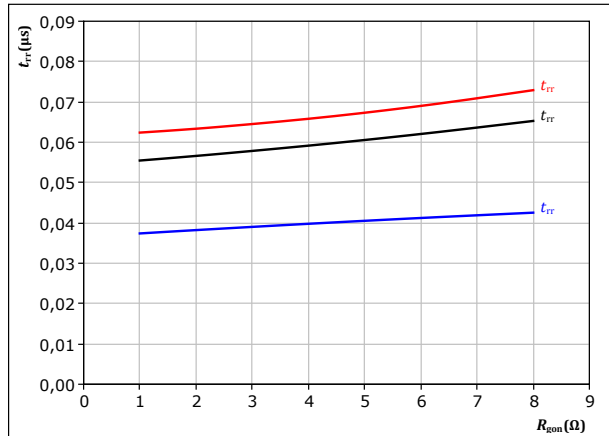
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C
125 °C
150 °C

figure 39.

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
 $I_C = 300$ A

T_j : 25 °C
125 °C
150 °C



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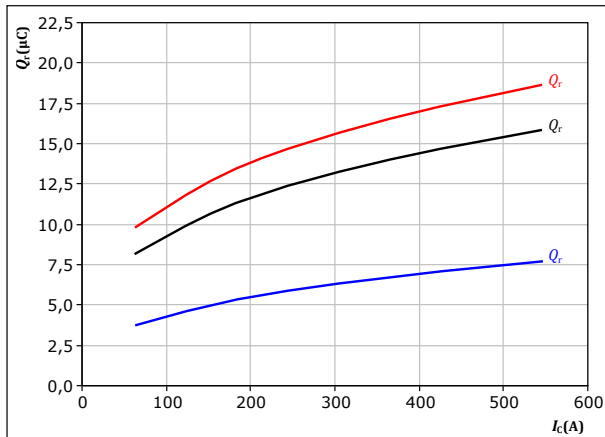
Boost Switching Characteristics

figure 40.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

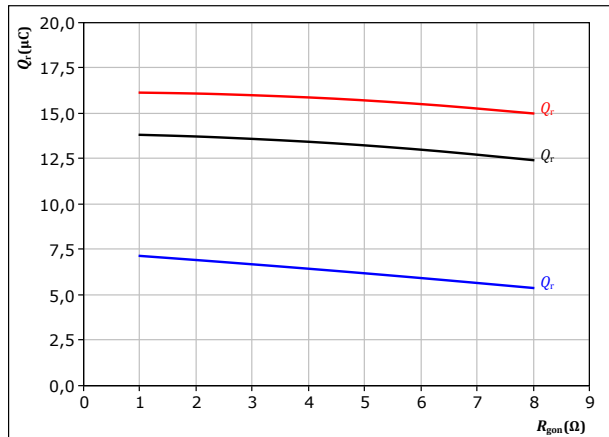
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 41.

FWD

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

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



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 300$ A

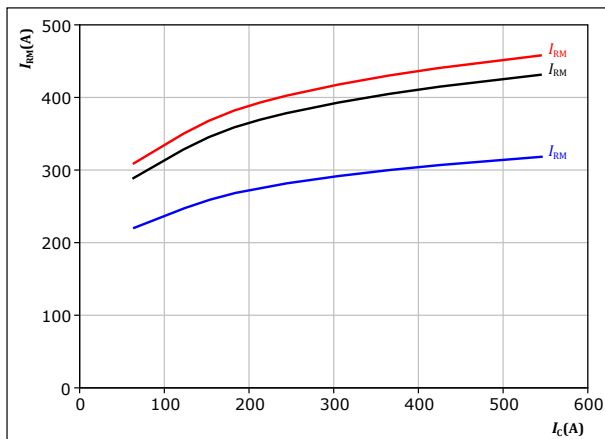
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 42.

FWD

Typical peak reverse recovery current as a function of collector current

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



With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

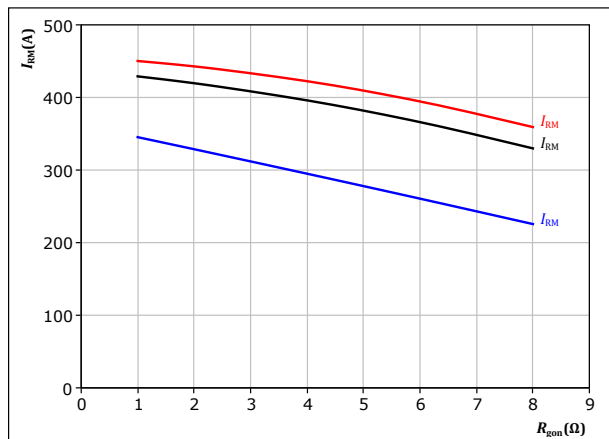
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 43.

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

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_c = 300$ A

T_j :
— 25 °C
— 125 °C
— 150 °C



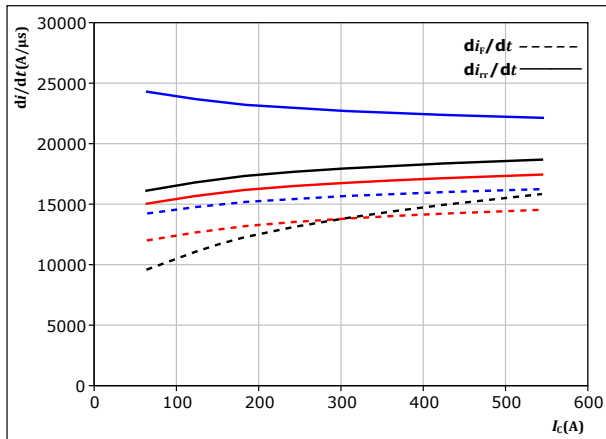
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datasheet

Boost Switching Characteristics

figure 44. FWD

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



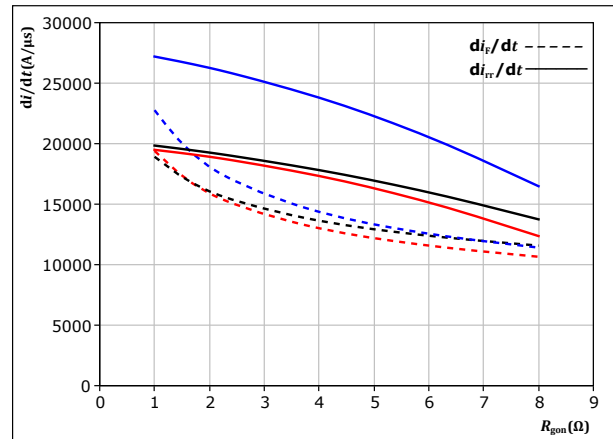
With an inductive load at

$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 45. 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

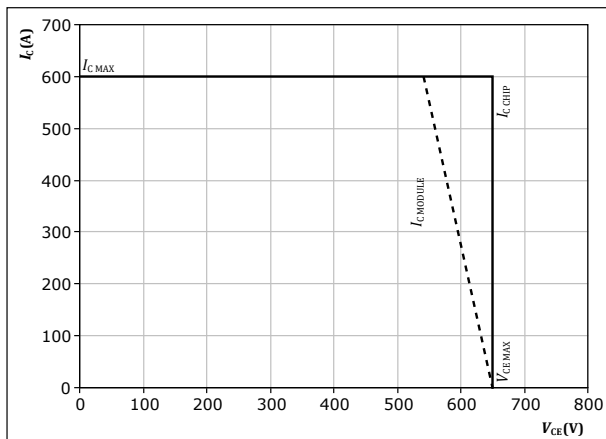
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_C = 300$ A

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 46. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



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



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Switching Definitions

figure 47. IGBT

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

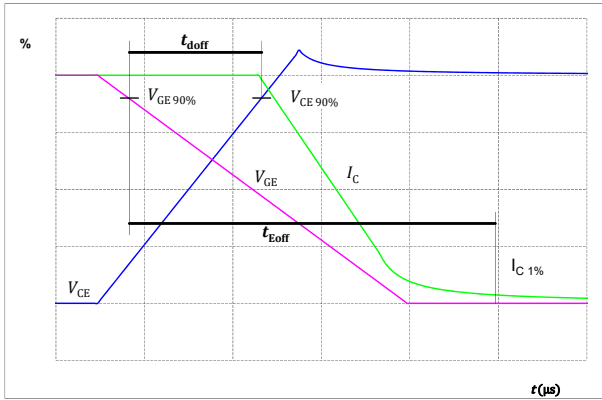


figure 48. IGBT

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

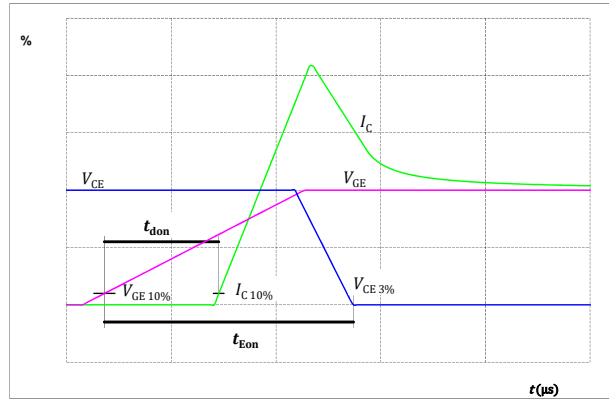


figure 49. IGBT

Turn-off Switching Waveforms & definition of t_f

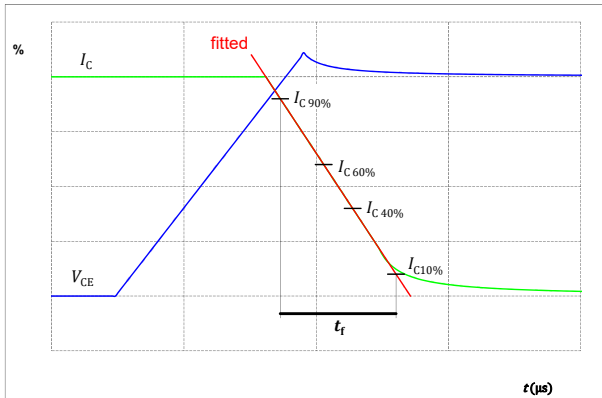
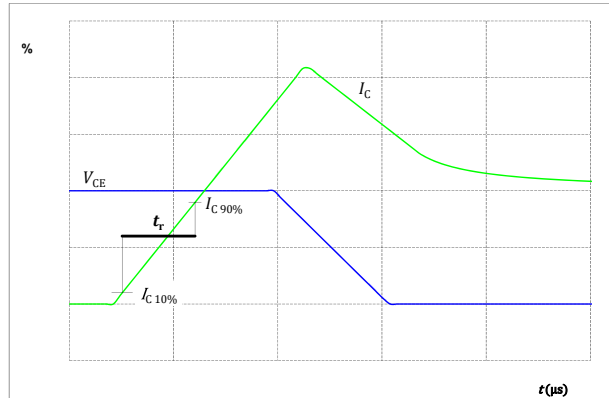


figure 50. IGBT

Turn-on Switching Waveforms & definition of t_r





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Switching Definitions

figure 51.

FWD

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

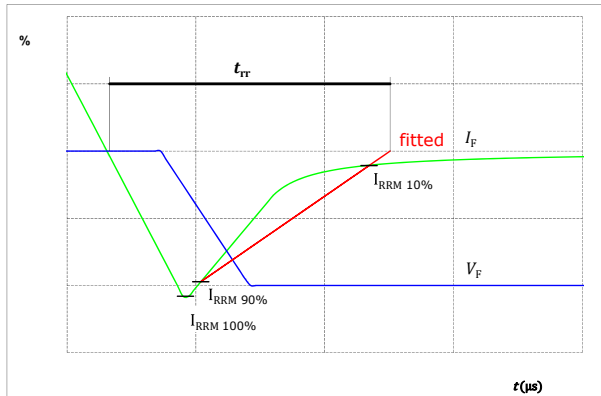
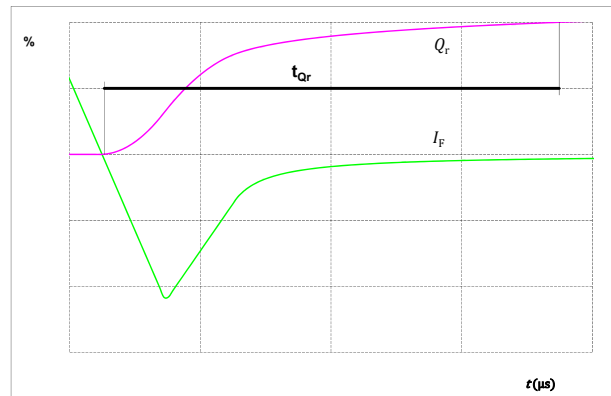


figure 52.

FWD

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





datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	30-E312NMA300H7-PM18F07Z
With thermal paste (5,2 W/mK, PTM6000HV)	30-E312NMA300H7-PM18F07Z-/7/

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

Outline							
Pin table [mm]							
Pin	X	Y	Function	39	40,16	48	Ph2
1	0	0	DC-1	40	43,36	48	Ph2
2	0	3,2	DC-1	41	46,56	48	Ph2
3	0	6,4	DC-1	42	49,76	48	Ph2
4	32	0	DC-1	43	52,96	48	Ph2
5	32	3,2	DC-1	44	56,16	48	Ph2
6	32	6,4	DC-1	45	59,36	48	Ph2
7	40,16	0	DC-2	46	62,56	48	Ph2
8	40,16	3,2	DC-2	47	16	41,6	G11-1
9	40,16	6,4	DC-2	48	56,16	41,6	G11-2
10	72,16	0	DC-2	49	16	44,8	S11-1
11	72,16	3,2	DC-2	50	56,16	44,8	S11-2
12	72,16	6,4	DC-2	51	6,4	35,2	G12-11
13	6,4	0	GND1	52	25,6	35,2	G12-12
14	6,4	3,2	GND1	53	46,56	35,2	G12-21
15	25,6	0	GND1	54	65,76	35,2	G12-22
16	25,6	3,2	GND1	55	3,2	35,2	S12-1
17	46,56	0	GND2	56	28,8	35,2	S12-1
18	46,56	3,2	GND2	57	43,36	35,2	S12-2
19	65,76	0	GND2	58	68,96	35,2	S12-2
20	65,76	3,2	GND2	59	6,4	6,4	G13-11
21	12,8	0	DC+1	60	25,6	6,4	G13-12
22	16	0	DC+1	61	46,56	6,4	G13-21
23	19,2	0	DC+1	62	65,76	6,4	G13-22
24	16	3,2	DC+1	63	9,6	6,4	S13-1
25	16	6,4	DC+1	64	22,4	6,4	S13-1
26	52,96	0	DC+2	65	49,76	6,4	S13-2
27	56,16	0	DC+2	66	62,56	6,4	S13-2
28	59,36	0	DC+2	67	9,6	25,6	G14-11
29	56,16	3,2	DC+2	68	22,4	25,6	G14-12
30	56,16	6,4	DC+2	69	49,76	25,6	G14-21
31	9,6	48	Ph1	70	62,56	25,6	G14-22
32	12,8	48	Ph1	71	12,8	25,6	S14-1
33	16	48	Ph1	72	19,2	25,6	S14-1
34	19,2	48	Ph1	73	52,96	25,6	S14-2
35	22,4	48	Ph1	74	59,36	25,6	S14-2
36	25,6	48	Ph1	75	72,16	48	Therm1
37	28,8	48	Ph1	76	72,16	44,8	Therm2
38	32	48	Ph1				

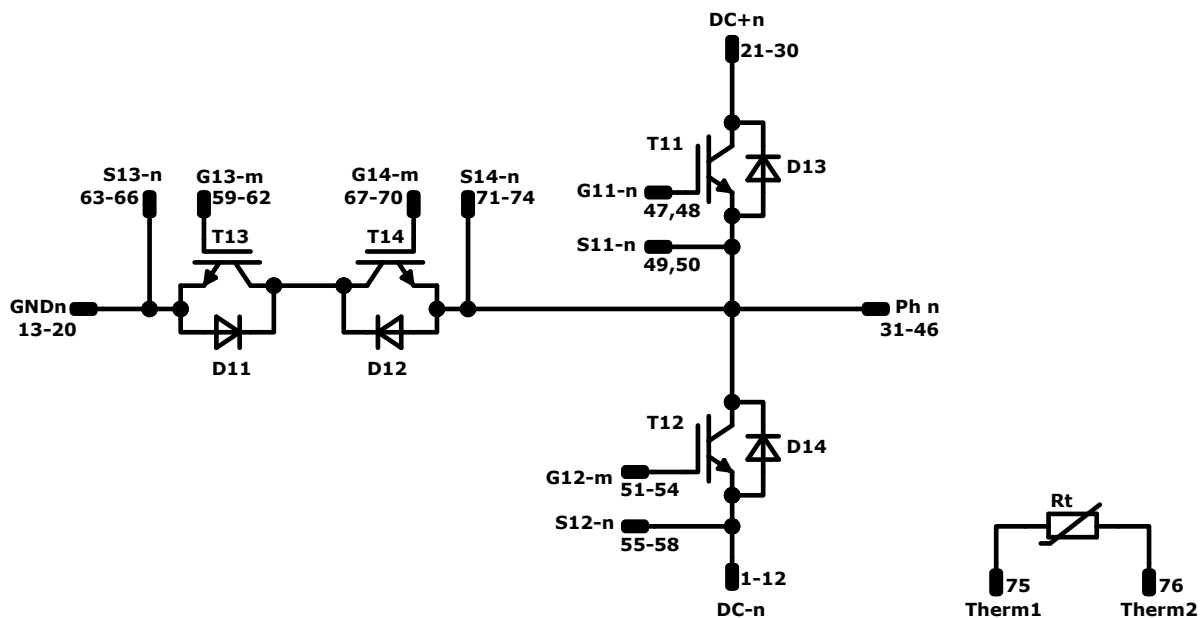


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datasheet

Pinout



$n=1,2$
 $m=11,12,21,22$ See exact Pin numbers and Pin functions on Outline

Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	300 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650 V	320 A	Buck Diode	Parallel devices. Values apply to complete device.
T13, T14	IGBT	650 V	300 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14	FWD	1200 V	400 A	Boost Diode	Parallel devices. Values apply to complete device.
Rt	Thermistor			Thermistor	



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Packaging instruction				
Standard packaging quantity (SPQ) 24	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow</i> E3BP packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> E3BP 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 $T_{j,sp}=175^{\circ}\text{C}$ and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.				

Document No.:	Date:	Modification:	Pages
30-E312NMA300H7-PM18F07Z-D1-14	25 Apr. 2025	Initial Release	

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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.