



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

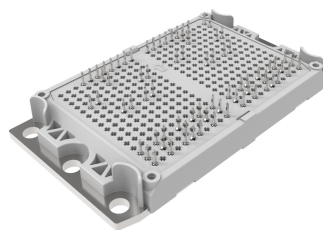
Target applications

Energy Storage Systems; Solar Inverters; UPS

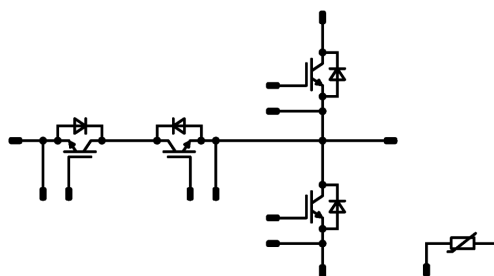
Types

- 30-E312NMA300H7-PM18F07Z

flow E3BP 12 mm housing



Schematic





Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	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



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

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



Vincotech

30-E312NMA300H7-PM18F07Z
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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0048	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
--	---------------	---	--	--	--	--	--	------	--	-----

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}					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



Vincotech

30-E312NMA300H7-PM18F07Z

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 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
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

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



Vincotech

30-E312NMA300H7-PM18F07Z

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	

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
--	---------------	---	--	--	--	--	--	------	--	-----

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



Vincotech

30-E312NMA300H7-PM18F07Z

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	

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	$V_r = 1200$ 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
--	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

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



Vincotech

30-E312NMA300H7-PM18F07Z
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	

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.



Vincotech

30-E312NMA300H7-PM18F07Z

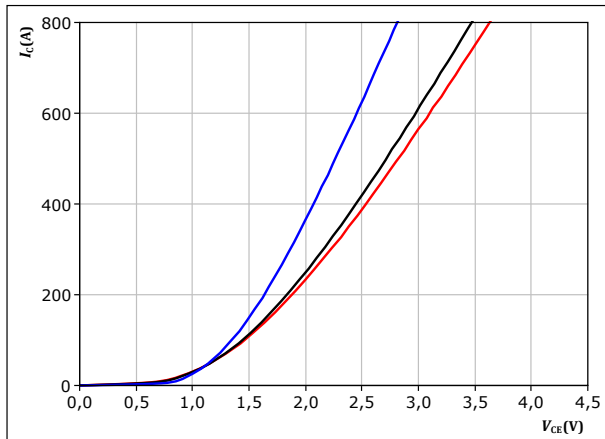
datasheet

Buck Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

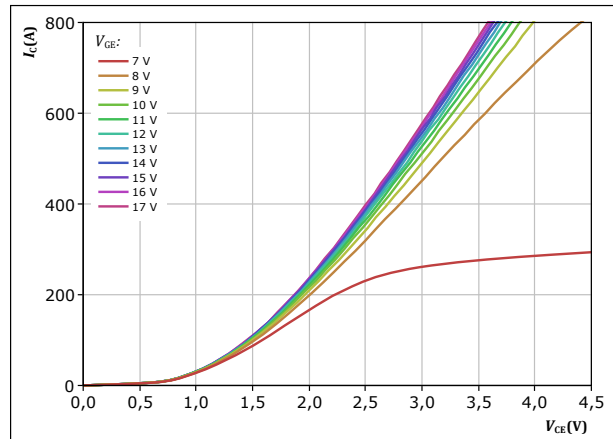


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 2. IGBT

Typical output characteristics

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

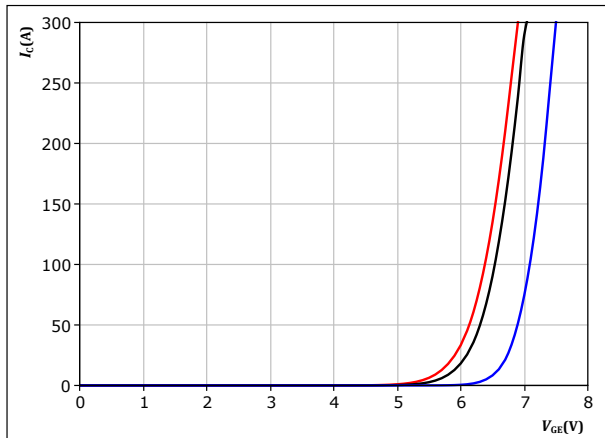


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

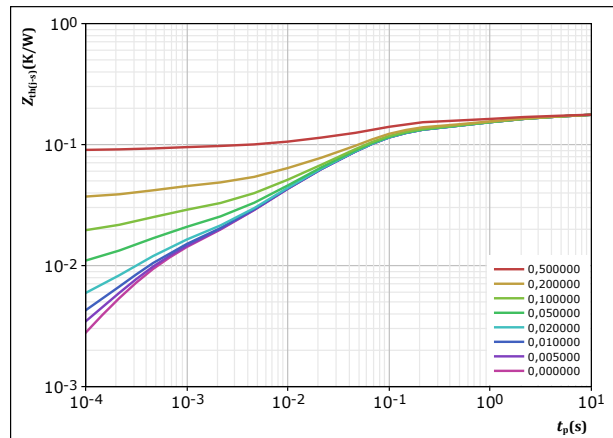


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ — 25 °C
— 125 °C
— 150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T = 0,177 \text{ K/W}$
IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
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



Vincotech

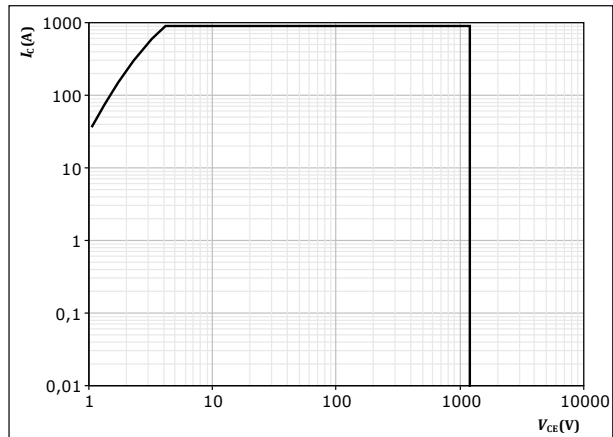
30-E312NMA300H7-PM18F07Z
datasheet

Buck Switch Characteristics

figure 5. IGBT

Safe operating area

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

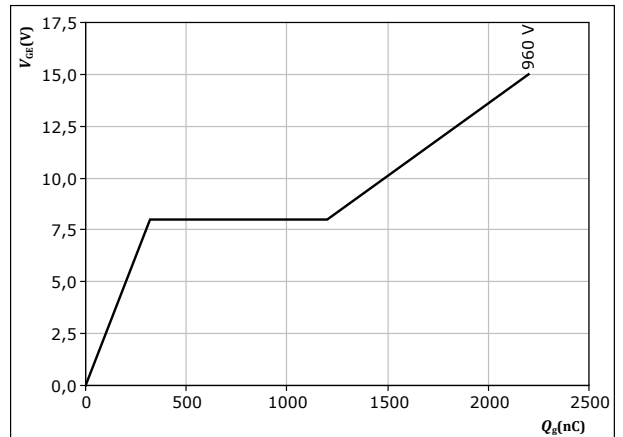


$D =$ single pulse
 $T_s = 80$ °C
 $V_{GE} = 15$ V
 $T_j = T_{jmax}$

figure 6. IGBT

Gate voltage vs gate charge

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



$I_C = 300$ A
 $T_j = 25$ °C



Vincotech

Buck Diode Characteristics

figure 7.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

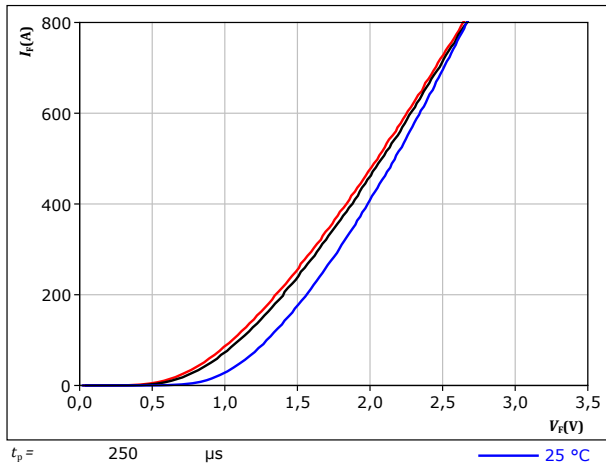
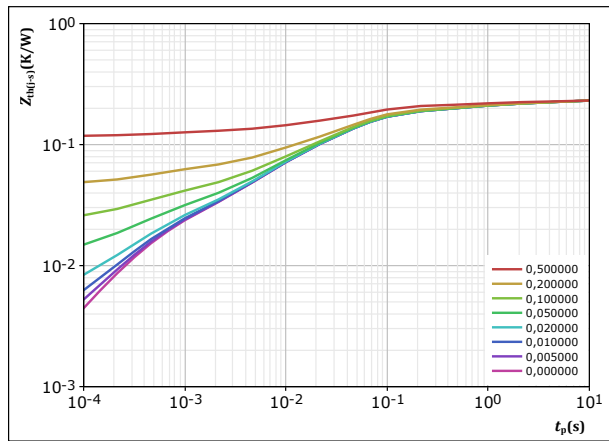


figure 8.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$	t_p / T
$R_{th(j-s)} =$	0,232 K/W
FWD thermal model values	
R (K/W)	τ (s)
2,30E-02	4,90E+00
3,28E-02	5,37E-01
1,22E-01	4,68E-02
3,85E-02	6,65E-03
1,74E-02	4,30E-04



Vincotech

30-E312NMA300H7-PM18F07Z

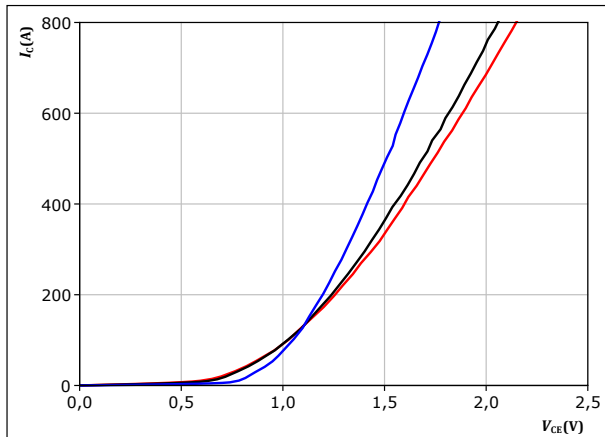
datasheet

Boost Switch Characteristics

figure 9. IGBT

Typical output characteristics

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

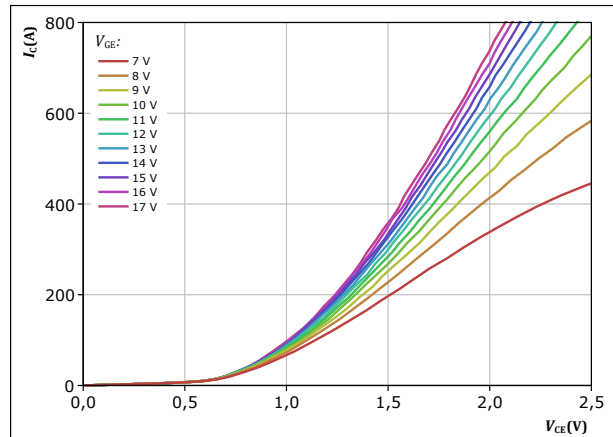


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 10. IGBT

Typical output characteristics

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

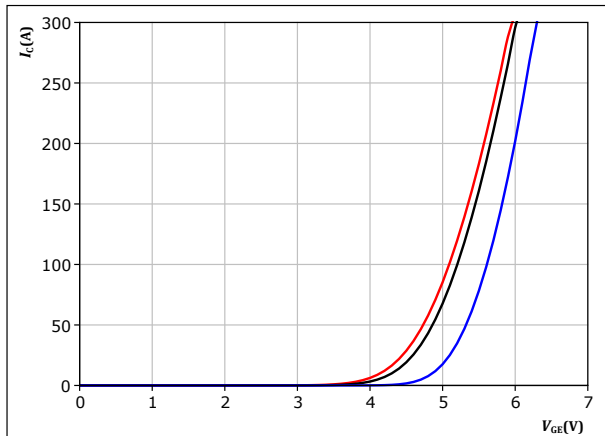


$t_p = 250 \mu s$
 $T_j = 150^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 11. IGBT

Typical transfer characteristics

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

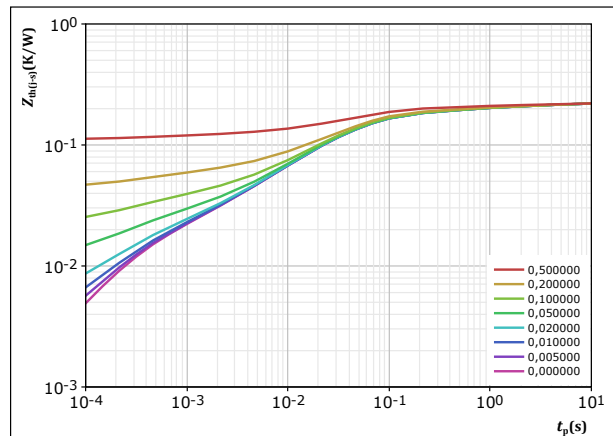


$t_p = 250 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25^\circ C, 125^\circ C, 150^\circ C$

figure 12. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-a)} = 0,221 K/W$
IGBT thermal model values

$R (K/W)$	$\tau (s)$
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



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

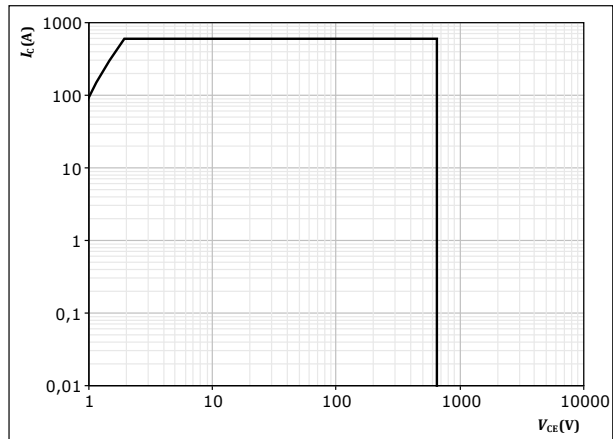
Boost Switch Characteristics

figure 13.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

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



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

Boost Diode Characteristics

figure 14.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

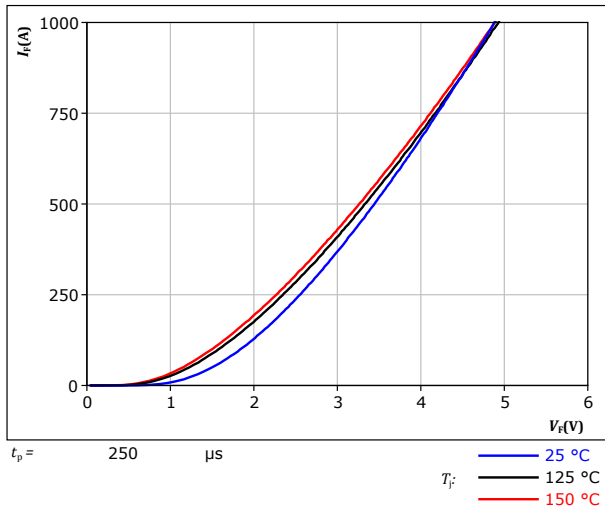
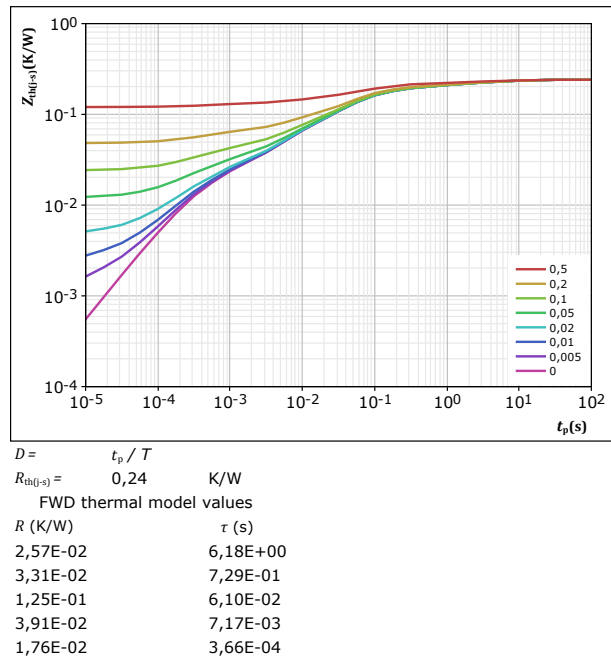


figure 15.

FWD

Transient thermal impedance as a function of pulse width

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





Vincotech

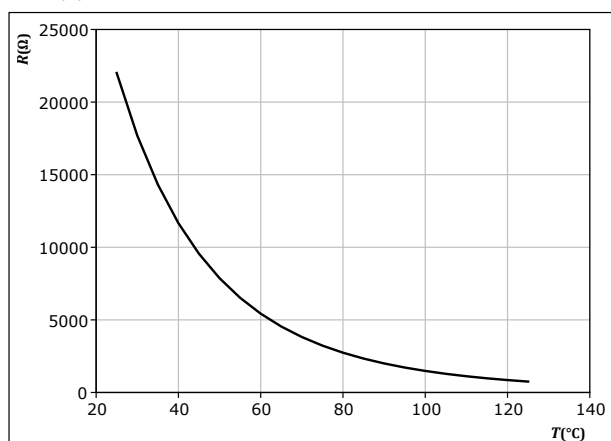
30-E312NMA300H7-PM18F07Z
datasheet

Thermistor Characteristics

figure 16. Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





Vincotech

30-E312NMA300H7-PM18F07Z datasheet

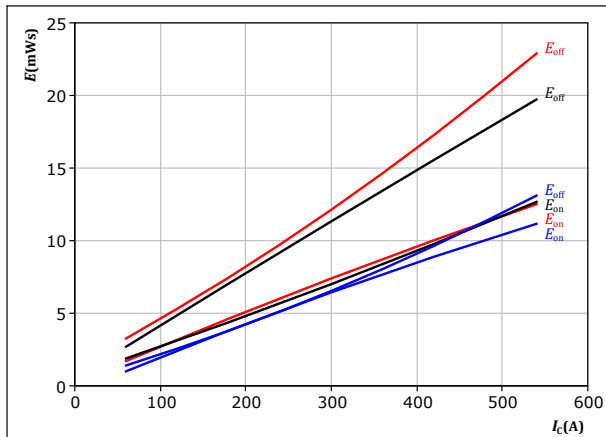
Buck Switching Characteristics

figure 17.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$



With an inductive load at

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

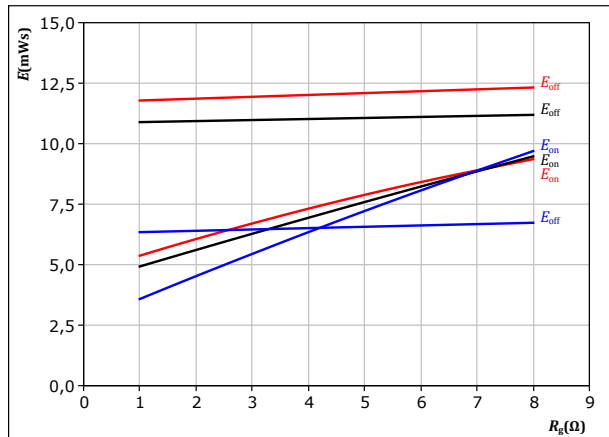
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 18.

IGBT

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

$$E = f(R_g)$$



With an inductive load at

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

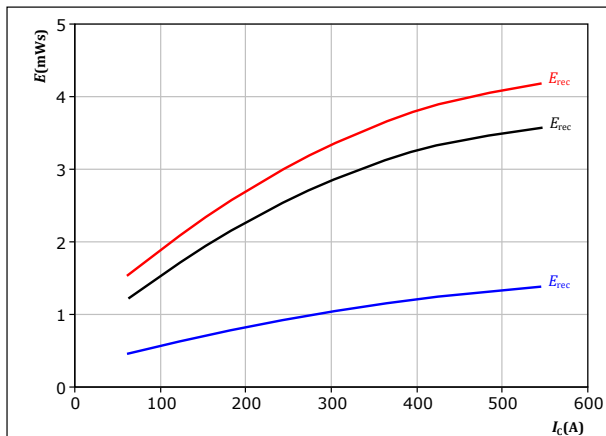
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 19.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

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

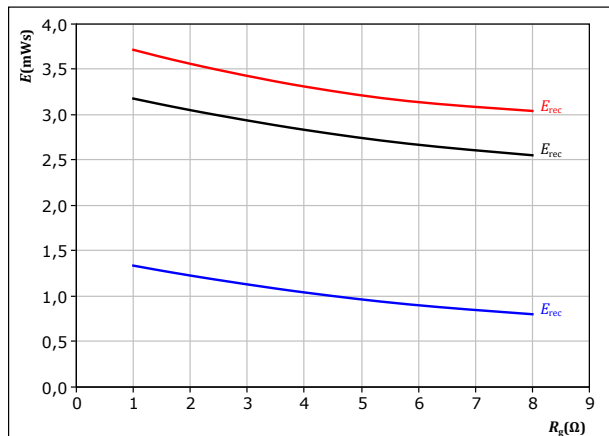
T_j :
— 25 °C
— 125 °C
— 150 °C

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

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

T_j :
— 25 °C
— 125 °C
— 150 °C



Vincotech

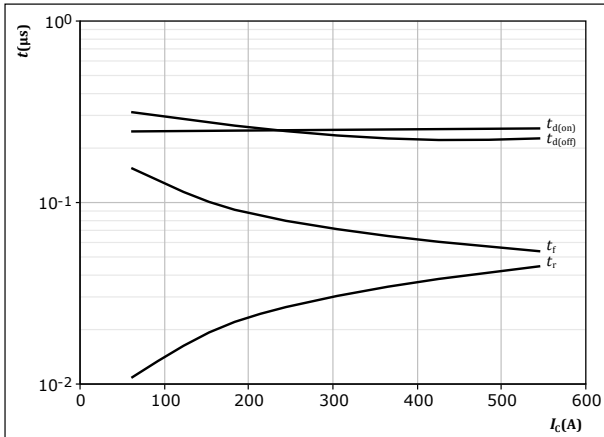
30-E312NMA300H7-PM18F07Z
datasheet

Buck Switching Characteristics

figure 21.

IGBT

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



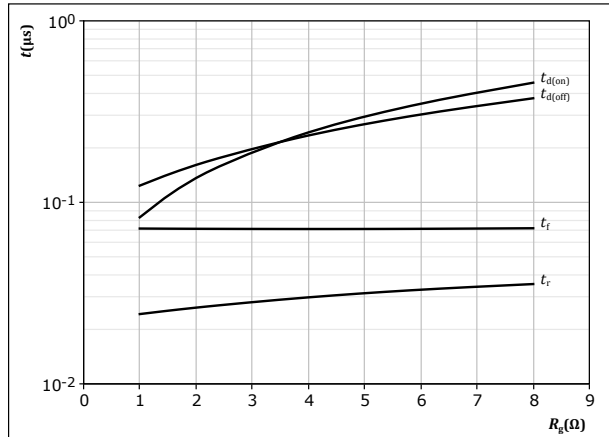
With an inductive load at

$T_j = 150$ °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
 $t = f(R_g)$



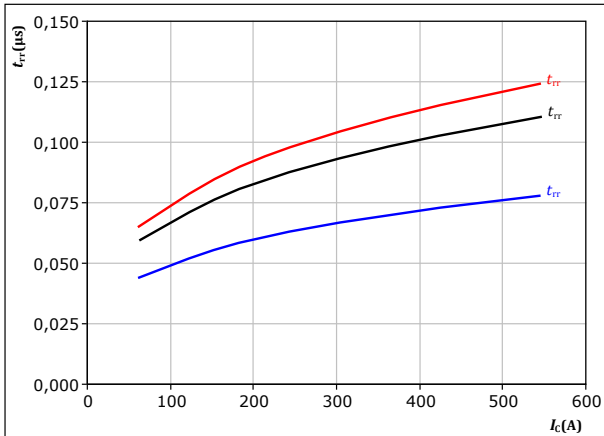
With an inductive load at

$T_j = 150$ °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

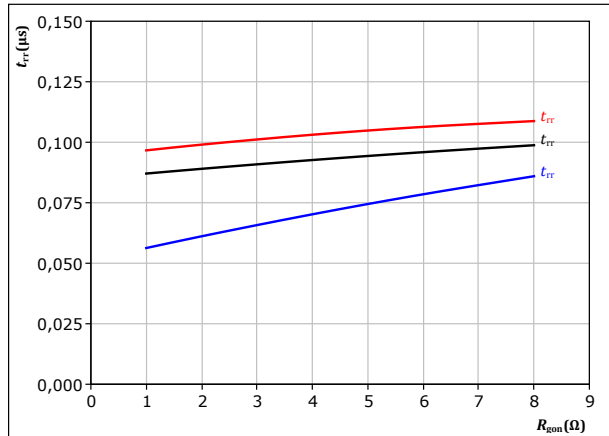
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C (blue)
125 °C (black)
150 °C (red)

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 (blue)
125 °C (black)
150 °C (red)



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

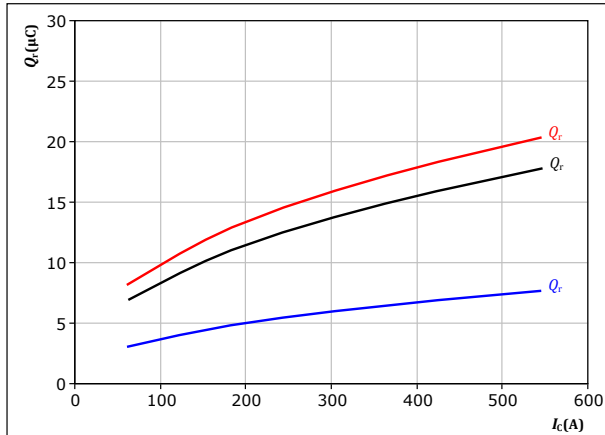
Buck Switching Characteristics

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

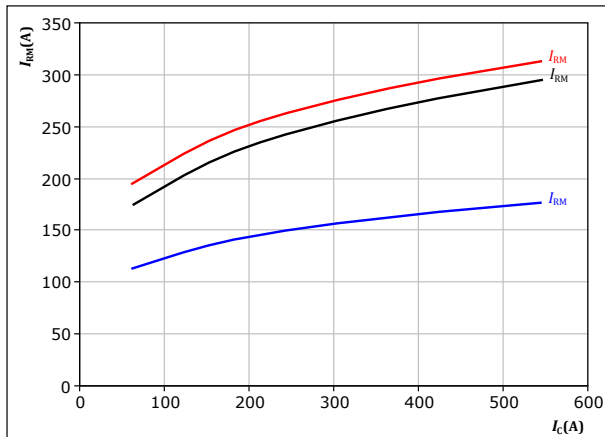
T_j :
— 25 °C
— 125 °C
— 150 °C

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

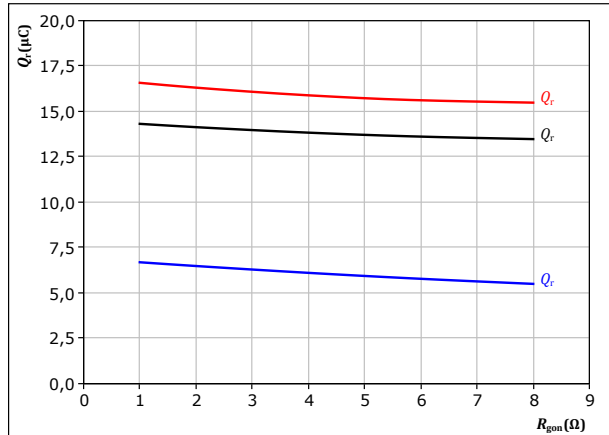
T_j :
— 25 °C
— 125 °C
— 150 °C

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

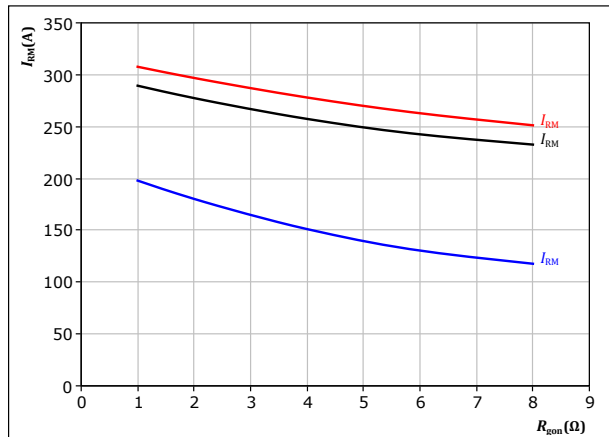
T_j :
— 25 °C
— 125 °C
— 150 °C

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



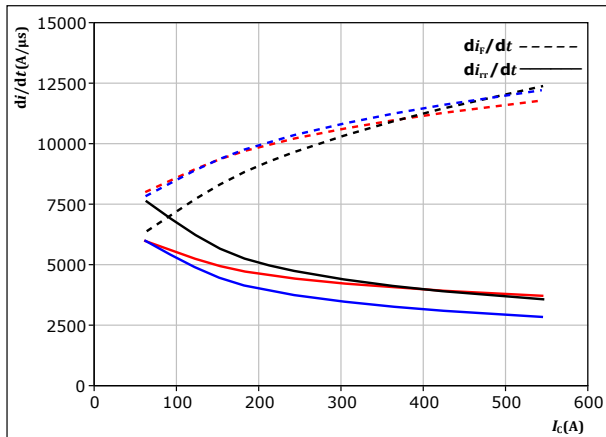
Vincotech

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
 $di_f/dt, di_r/dt = f(I_C)$



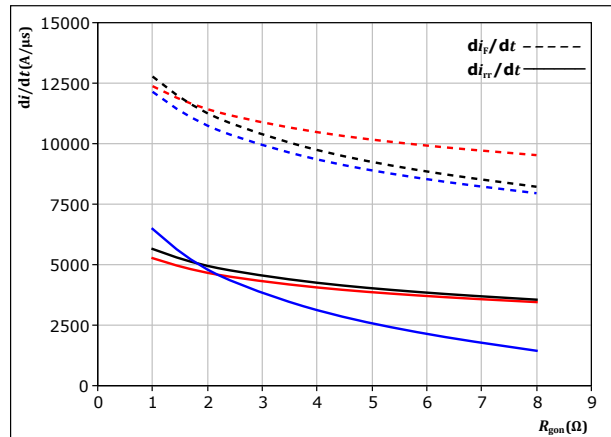
With an inductive load at

$V_{CE} = 350$ 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

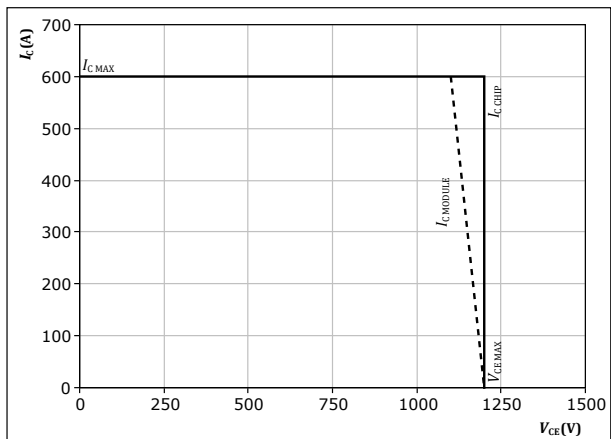
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $I_C = 300$ A

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



Vincotech

30-E312NMA300H7-PM18F07Z datasheet

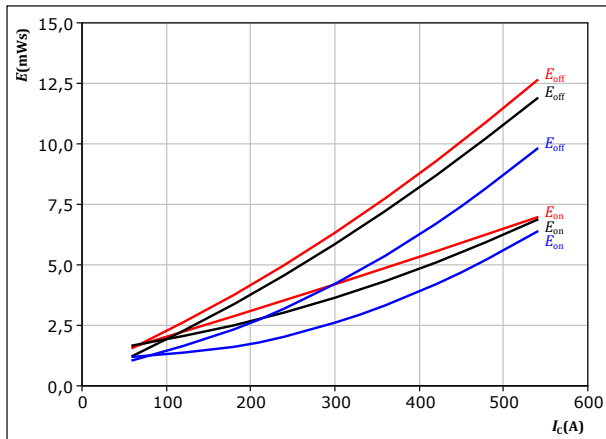
Boost Switching Characteristics

figure 32.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

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

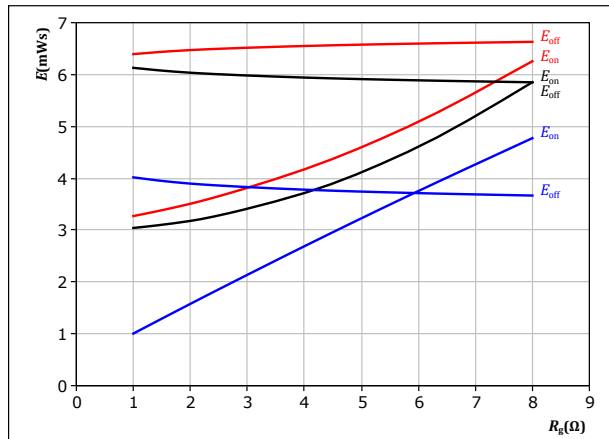
T_j :
— 25 °C
— 125 °C
— 150 °C

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

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

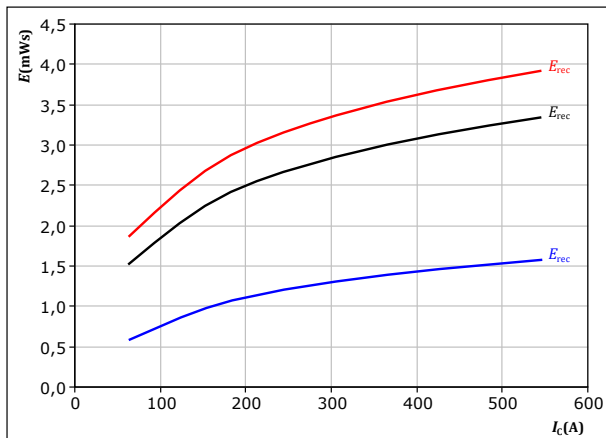
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 34.

FWD

Typical reverse recovered energy loss as a function of collector current

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



With an inductive load at

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

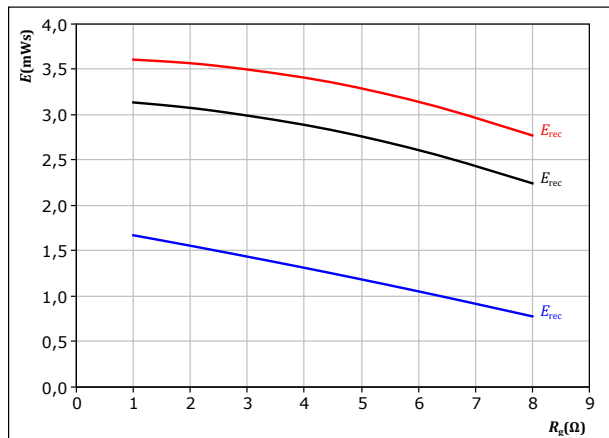
T_j :
— 25 °C
— 125 °C
— 150 °C

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



Vincotech

30-E312NMA300H7-PM18F07Z

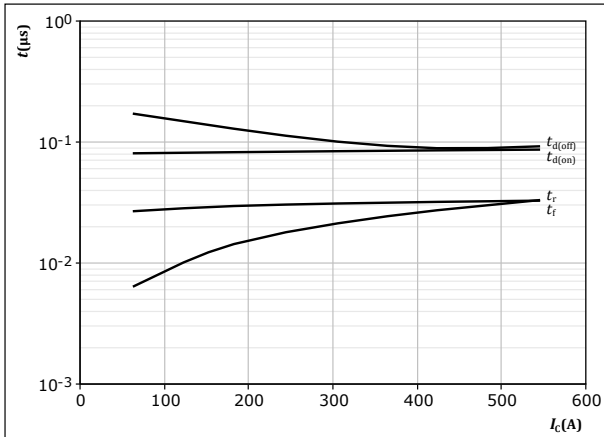
datasheet

Boost Switching Characteristics

figure 36.

IGBT

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



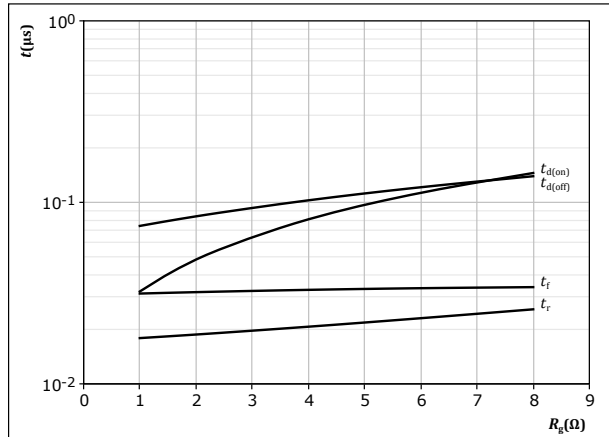
With an inductive load at

$T_j = 150$ °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
 $t = f(R_g)$



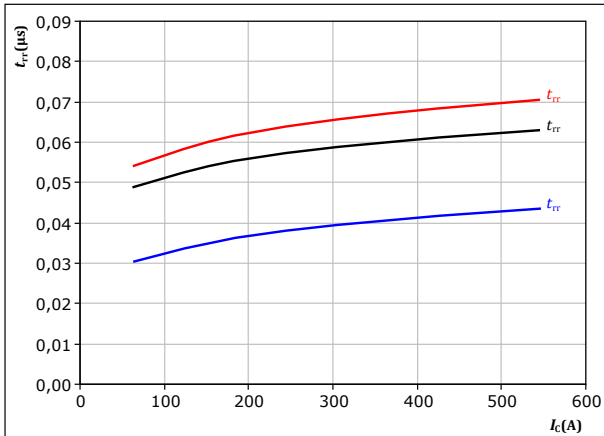
With an inductive load at

$T_j = 150$ °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

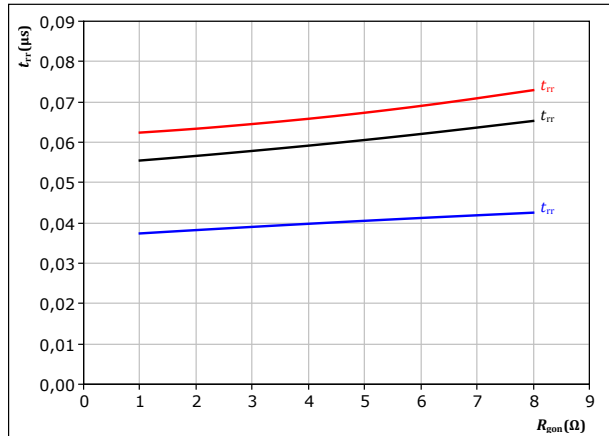
$V_{CE} = 350$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

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



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

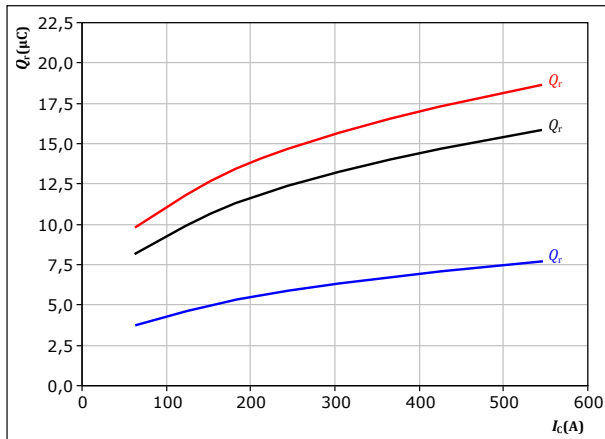
Boost Switching Characteristics

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

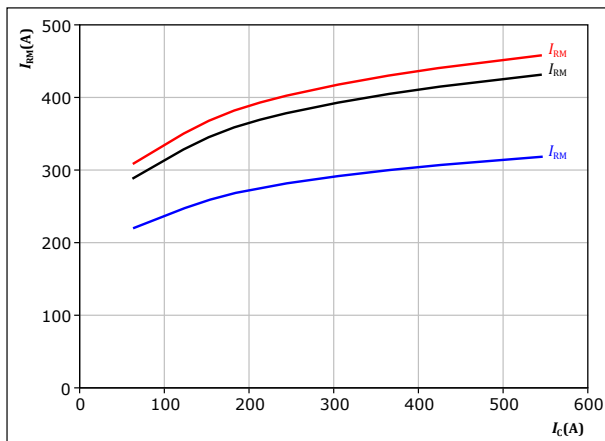
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 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

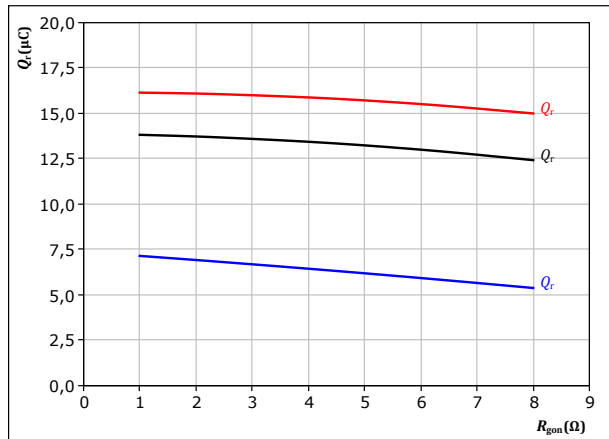
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 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

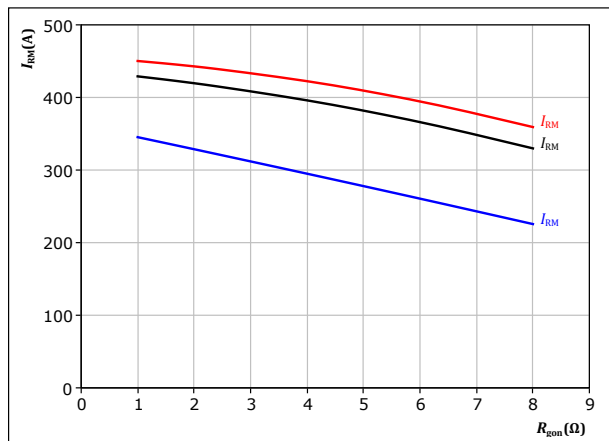
T_j :
— 25 °C
— 125 °C
— 150 °C

figure 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



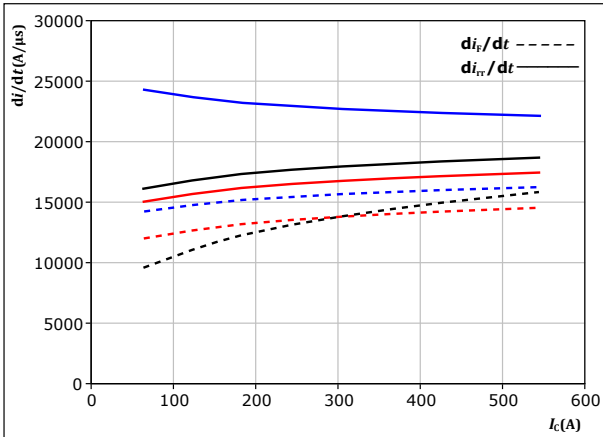
Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

Boost Switching Characteristics

figure 44. FWD

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



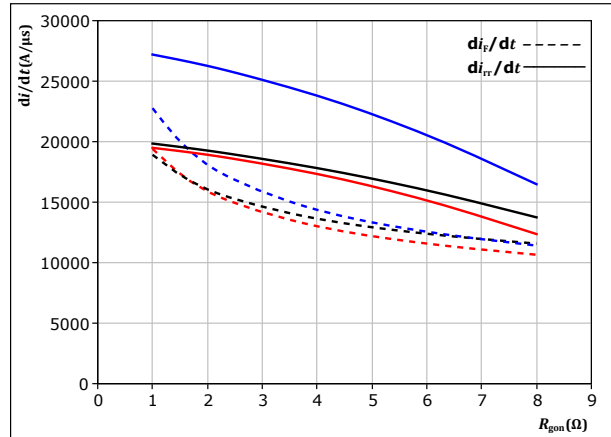
With an inductive load at

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

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

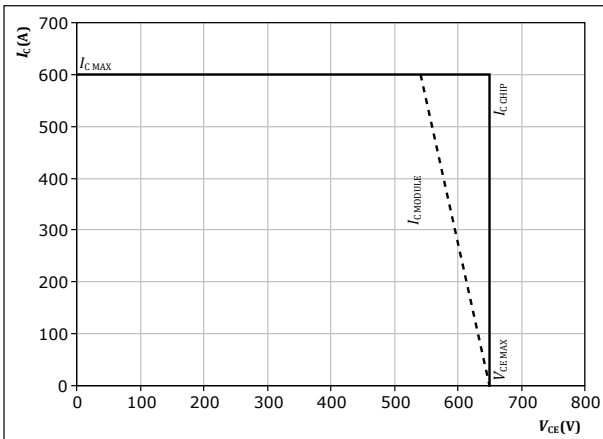
$V_{CE} = 350 \text{ V}$
 $V_{GE} = \pm 15 \text{ V}$
 $I_C = 300 \text{ A}$

T_j :
— 25 °C
— 125 °C
— 150 °C

figure 46. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At $T_j = 150 \text{ } ^\circ\text{C}$
 $R_{gon} = 4 \text{ } \Omega$
 $R_{goff} = 4 \text{ } \Omega$



Vincotech

30-E312NMA300H7-PM18F07Z datasheet

Switching Definitions

figure 47. IGBT

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

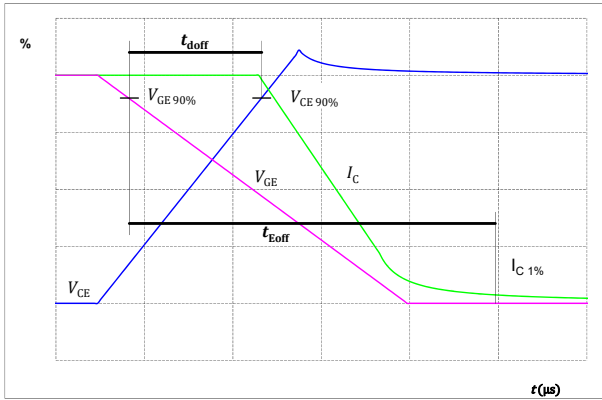


figure 48. IGBT

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

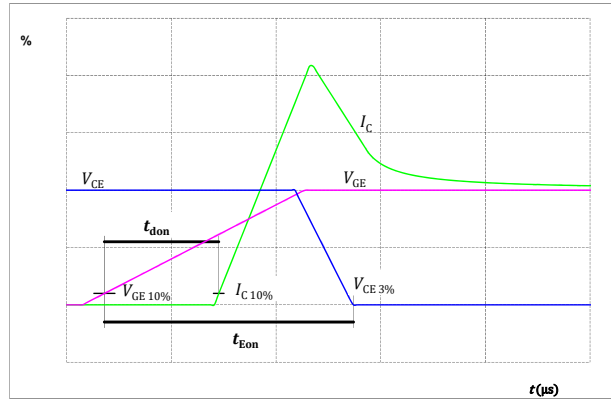


figure 49. IGBT

Turn-off Switching Waveforms & definition of t_f

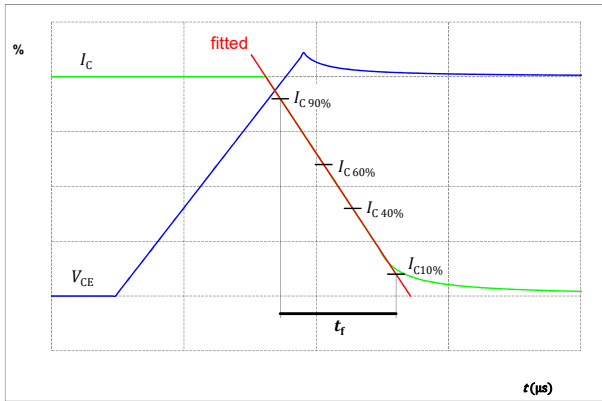
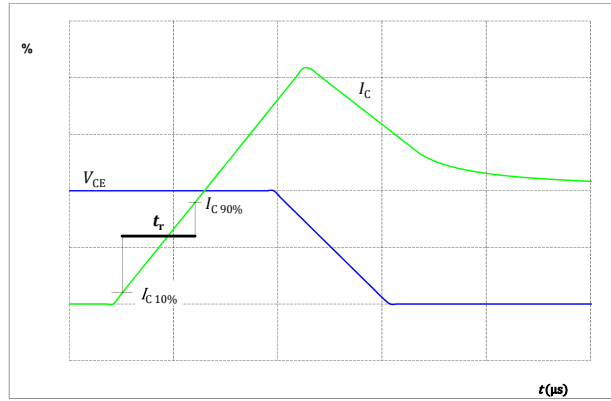


figure 50. IGBT

Turn-on Switching Waveforms & definition of t_r





Vincotech

Switching Definitions

figure 51.

FWD

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

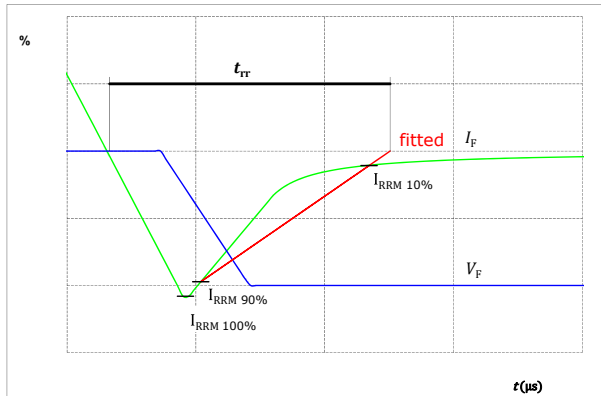
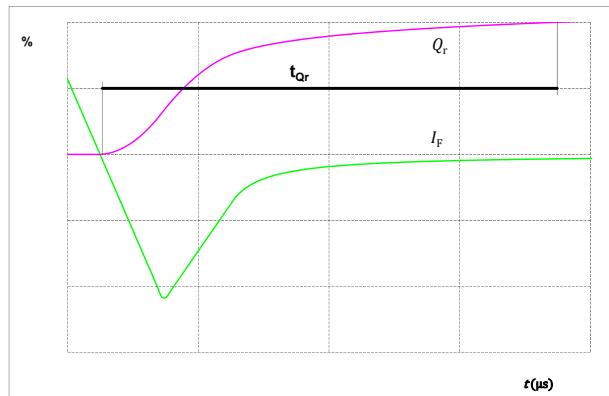


figure 52.

FWD

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





Vincotech

30-E312NMA300H7-PM18F07Z

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
		NN-NNNNNNNNNNNNNNNN- TTTT		WWYY	UL VIN	LLLL
	Datamatrix	Type&Ver	Lot number	Serial	Date code	Serial
		TTTTTTTV	LLLLL	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				

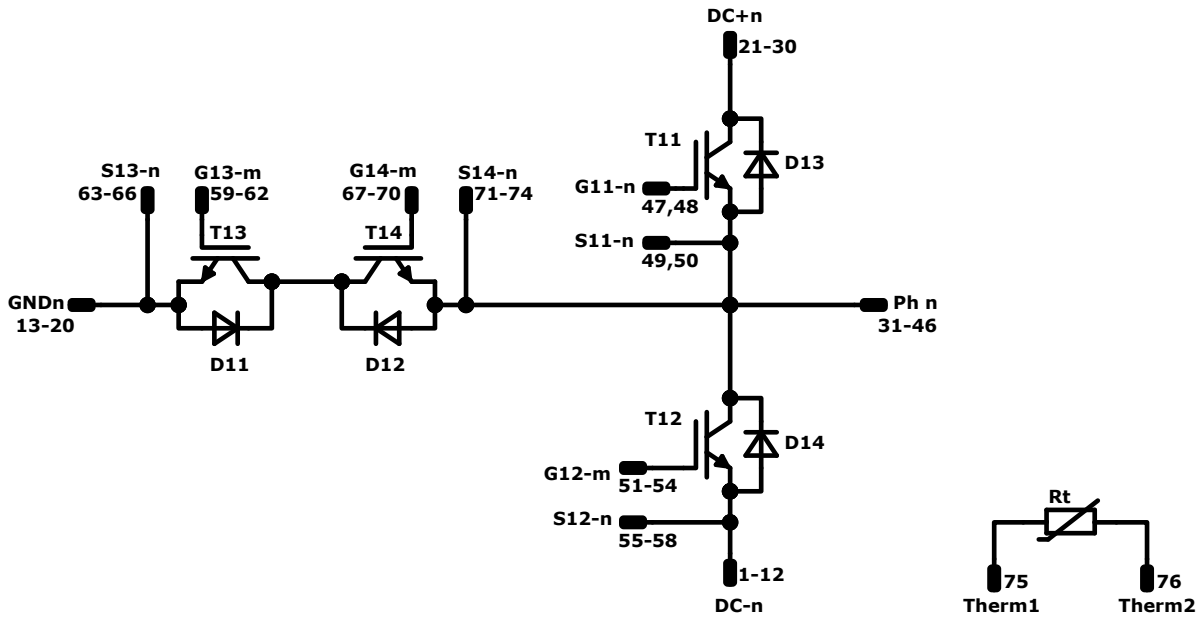


Vincotech

30-E312NMA300H7-PM18F07Z

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	



Vincotech

30-E312NMA300H7-PM18F07Z
datasheet

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-D2-14	21 Nov. 2025	Change Outline drawing according to PCN-2025-026	

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.