30-FT12NMA300H7-PL99F08

datasheet

***flow*MNPC 2** **1200 V / 300 A**

Topology features

- Mixed Voltage Neutral Point Clamped Topology (T-Type)
- Kelvin Emitter for improved switching performance
- Split output for elimination of X-conduction at fast turn-on
- Low inductive commutation loop
- 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
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Solder pin

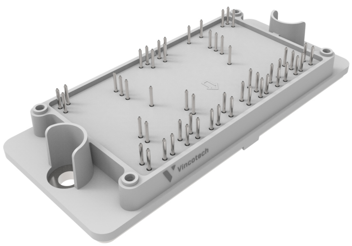
Target applications

- Energy Storage Systems
- Solar Inverters
- UPS

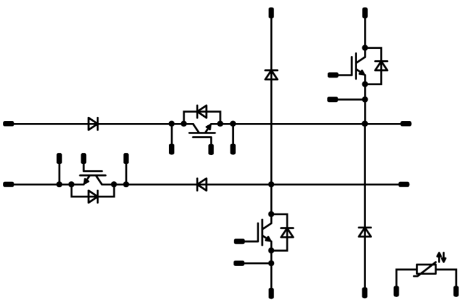
Types

- 30-FT12NMA300H7-PL99F08

flow 2 13 mm housing



Schematic



Maximum Ratings

T_j = 25 °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 °C	211	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	420	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 °C	232	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	304	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 °C	32 (1)	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		32	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	82	W
Maximum junction temperature	T_{jmax}			175	°C

(1) limited by I_{FRM}

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	247	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	340	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 °C	231	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	383	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	38	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	69	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
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 s	6000	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 200	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
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_{CEsat}		15		300	25 125 150		1,86 2,16 2,22	2,15(2)	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 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 V	0/15		300	25		2200		nC
Thermal										
Thermal resistance junction to sink(3)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,23		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	300	25 125 150		232,65 236,3 236,97		ns
Rise time	t_r					25 125 150		32,46 35,17 36,76		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		192,99 219,9 226,64		ns
Fall time	t_f					25 125 150		31,32 52,51 55,84		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=6,51 μC Q_{rFWD}=14,66 μC Q_{rFWD}=17,12 μC				25 125 150		5,81 6,68 7,09		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,93 9,42 10,32		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Buck Diode										
Static										
Forward voltage	V_F				300	25 125 150		1,53 1,49 1,46	1,92(2)	V
Reverse leakage current	I_R	V_r = 650 V				25			15,2	µA
Thermal										
Thermal resistance junction to sink(3)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,31		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=6515 A/µs di/dt=7512 A/µs di/dt=7415 A/µs	±15	350	300	25 125 150		141,15 213,72 230,96		A
Reverse recovery time	t_{rr}					25 125 150		75,18 110,59 121,36		ns
Recovered charge	Q_r					25 125 150		6,51 14,66 17,12		µC
Reverse recovered energy	E_{rec}					25 125 150		1,24 3,03 3,57		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3199,35 3577,27 3138,39		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Buck Sw. Protection Diode										
Static										
Forward voltage	V_F				16	25 125 150		2,82 2,36 2,24	3,2[(2)]	V
Reverse leakage current	I_R	V_r = 1200 V				25 150			200 1000	μA
Thermal										
Thermal resistance junction to sink[(3)]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,16		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost 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_{CEsat}		15		300	25 125 150	1,15	1,31 1,41 1,44	1,8[2]	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 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 V	±15		300	25		1220		nC
Thermal										
Thermal resistance junction to sink[3]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,28		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	112,5	25 125 150		72,36 73,78 73,82		ns
Rise time	t_r					25 125 150		9,25 10,62 11,37		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		103,49 133,91 143,01		ns
Fall time	t_f					25 125 150		18,53 26,02 30,14		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=10,63 µC Q_{rFWD}=22,72 µC Q_{rFWD}=26,8 µC				25 125 150		1,71 2,52 2,71		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,23 2,14 2,42		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				300	25 125 150	1,45	1,88 1,88 1,85	1,95(2)	V
Reverse leakage current	I_R	V_r = 1200 V				25			3,04	μA
Thermal										
Thermal resistance junction to sink(3)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,25		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=11574 A/μs d*i*/d*t*=10074 A/μs d*i*/d*t*=9440 A/μs	±15	350	112,5	25 125 150		244,79 311,56 331,6		A
Reverse recovery time	t_{rr}					25 125 150		118,33 211,31 247,53		ns
Recovered charge	Q_r					25 125 150		10,63 22,72 26,8		μC
Reverse recovered energy	E_{rec}					25 125 150		2,59 5,87 6,97		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		10927,25 7456,47 7419,11		A/μs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	
Boost Sw. Protection Diode										
Static										
Forward voltage	V_{F}				16	25 125 150		2,14 1,56 1,44	3(2)	V
Reverse leakage current	I_{R}	V_{r} = 650 V				25			20	µA
Thermal										
Thermal resistance junction to sink(3)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,38		K/W
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

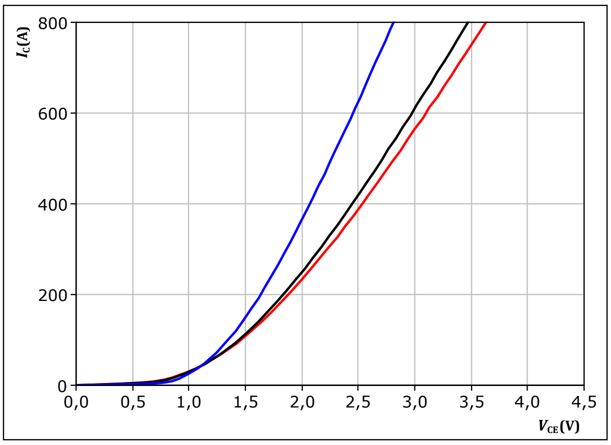
(2) Value at chip level
(3) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



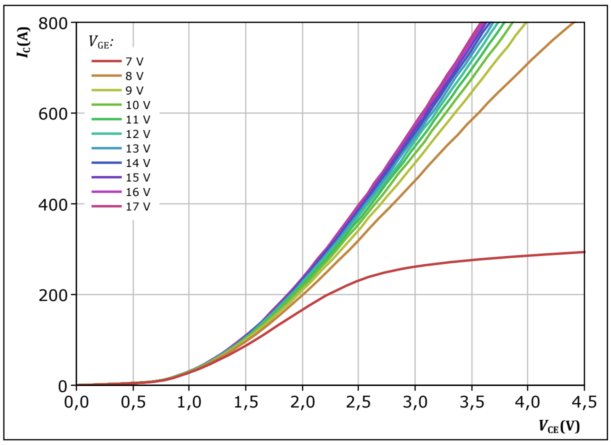
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



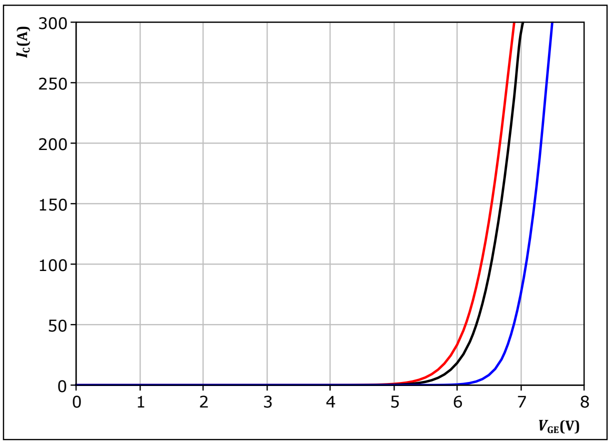
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



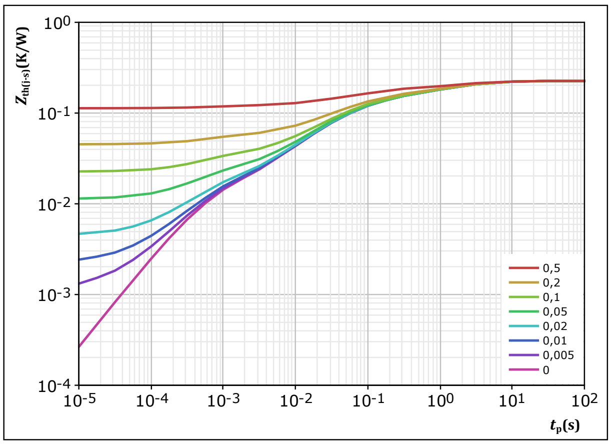
t_p =	250	µs
V_{CE} =	10	V

T_j: 25 °C, 125 °C, 150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,226 K/W

IGBT thermal model values

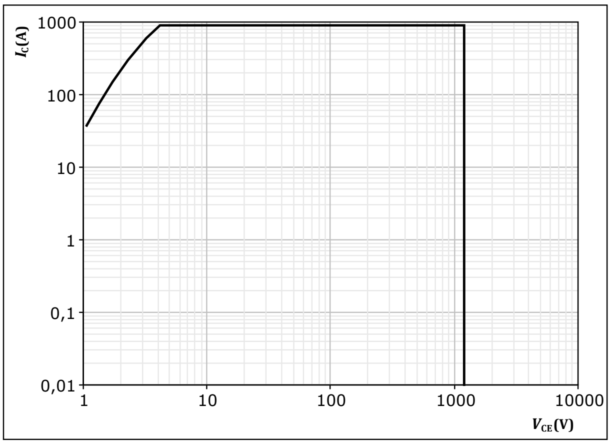
R (K/W)	τ (s)
3,11E-02	4,96E+00
5,83E-02	8,83E-01
8,44E-02	7,76E-02
3,97E-02	1,44E-02
1,26E-02	5,52E-04

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})



D = single pulse

T_s = 80 °C

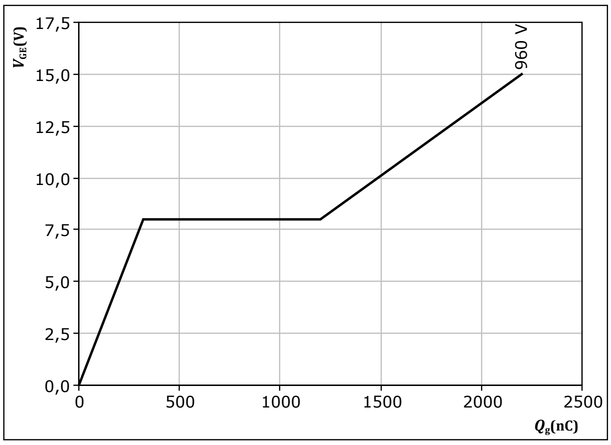
V_{GE} = 15 V

T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



I_C = 75 A

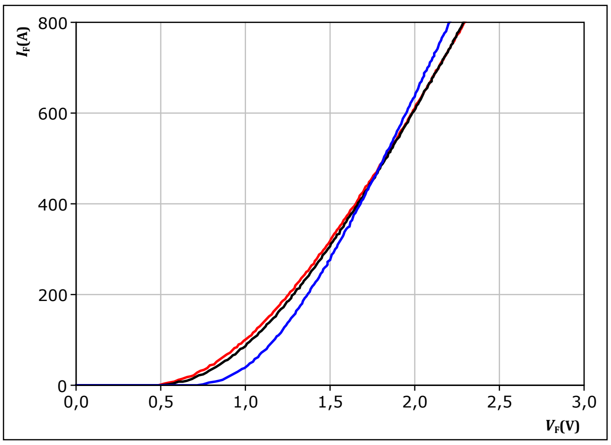
T_j = 25 °C

Buck Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



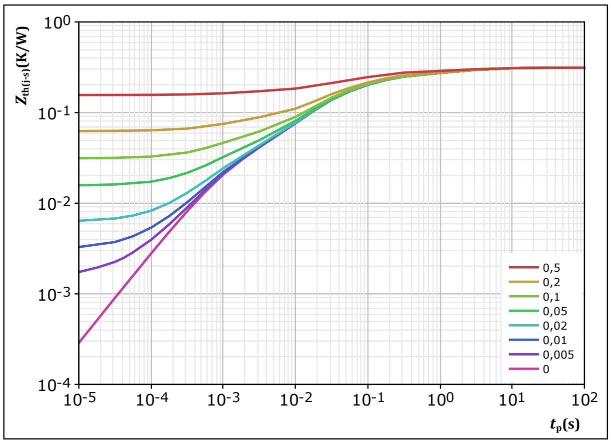
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,313 K/W

FWD thermal model values

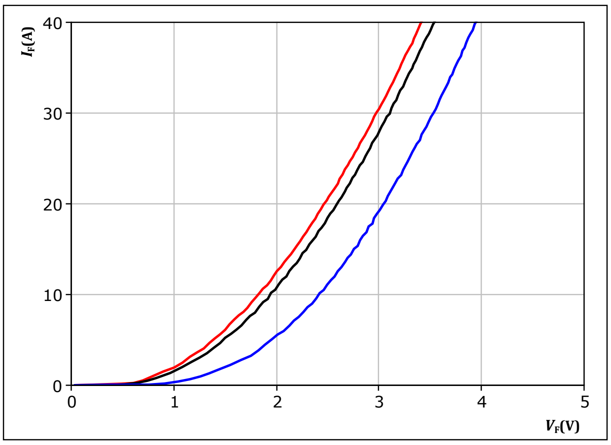
R (K/W)	τ (s)
2,60E-02	5,11E+00
4,54E-02	1,05E+00
1,16E-01	1,00E-01
1,02E-01	1,92E-02
2,34E-02	1,04E-03

Buck Sw. Protection Diode Characteristics

figure 9. FWD

Typical forward characteristics

I_F = f(V_F)



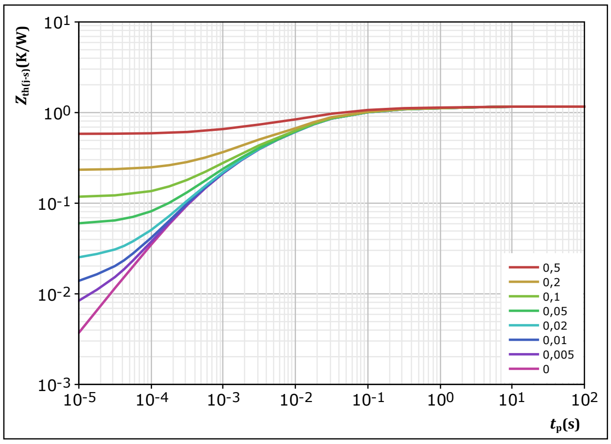
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 10. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,164 K/W

FWD thermal model values

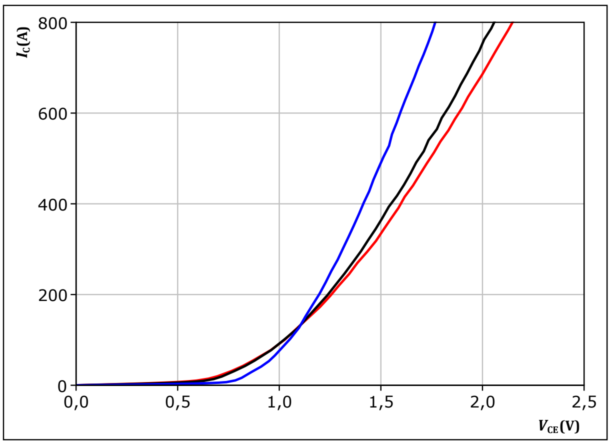
R (K/W)	τ (s)
7,05E-02	2,32E+00
1,99E-01	1,21E-01
5,32E-01	1,69E-02
2,77E-01	2,12E-03
8,54E-02	4,04E-04

Boost Switch Characteristics

figure 11.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

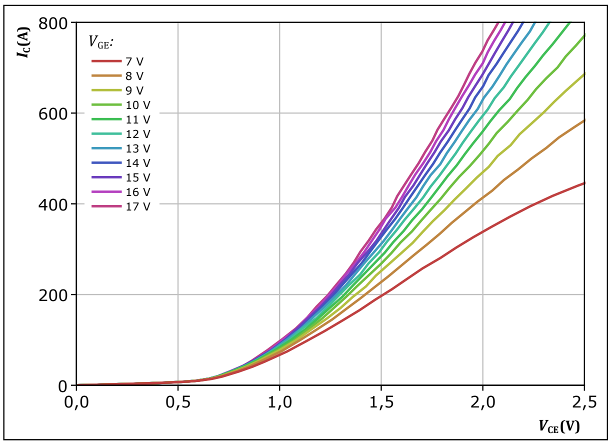


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 12.	**IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



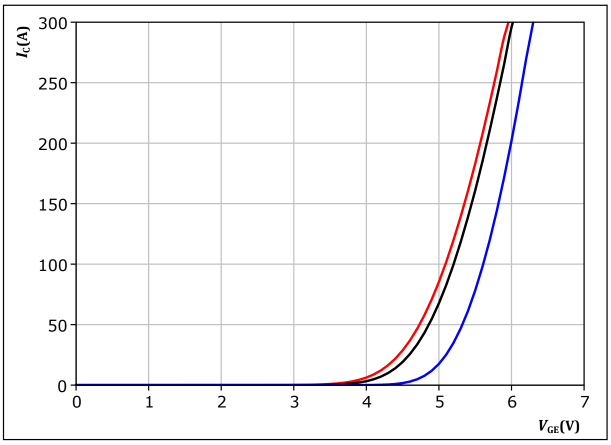
t_p =	250	µs
T_j =	150	°C

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

figure 13.	**IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

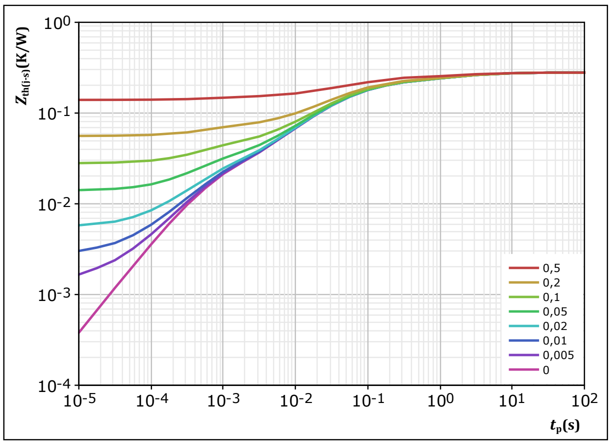


t_p =	250	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 14.	**IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,279	K/W

IGBT thermal model values

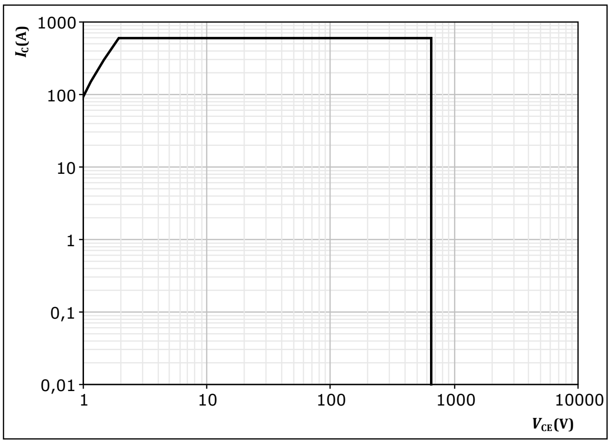
R (K/W)	τ (s)
2,62E-02	5,54E+00
4,88E-02	8,94E-01
1,23E-01	7,13E-02
6,30E-02	1,34E-02
1,82E-02	5,73E-04

Boost Switch Characteristics

figure 15. **IGBT**

Safe operating area

I_C = f(V_{CE})



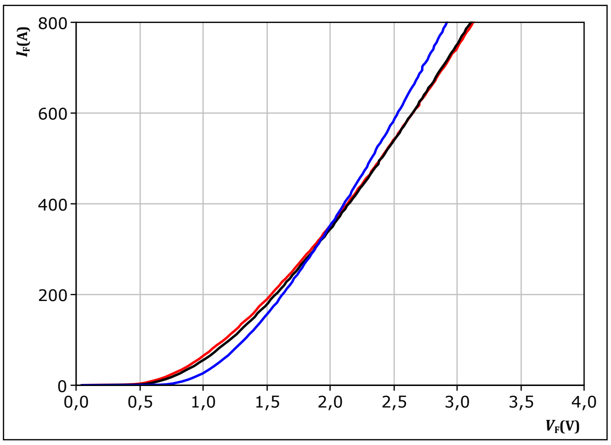
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 16. FWD

Typical forward characteristics

$I_F = f(V_F)$



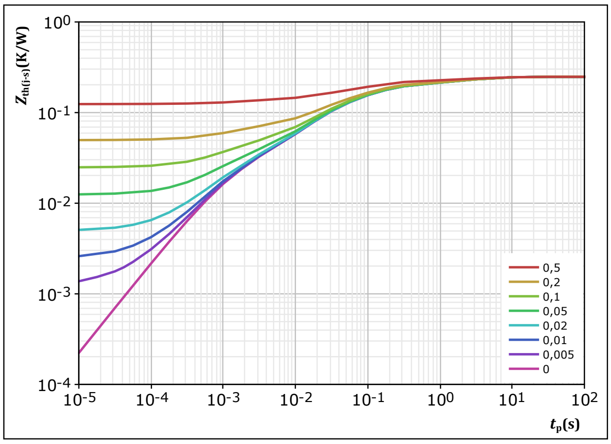
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 17. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,248 K/W

FWD thermal model values

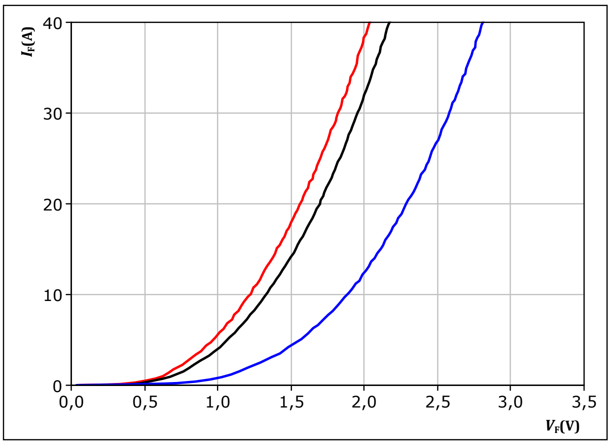
R (K/W)	τ (s)
2,92E-02	4,39E+00
2,98E-02	9,64E-01
9,89E-02	1,01E-01
6,96E-02	1,98E-02
2,07E-02	1,16E-03

Boost Sw. Protection Diode Characteristics

figure 18. FWD

Typical forward characteristics

I_F = f(V_F)



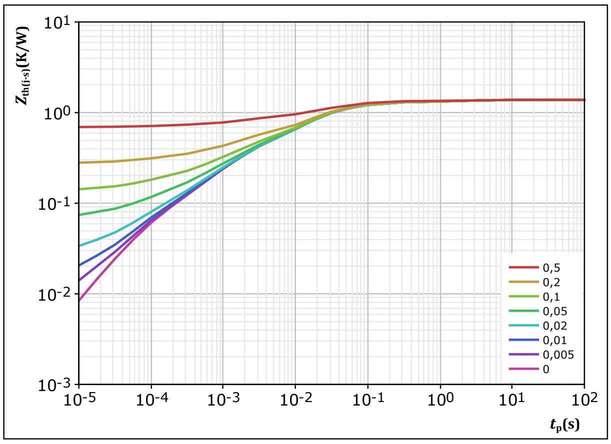
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 19. FWD

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,382 K/W

FWD thermal model values

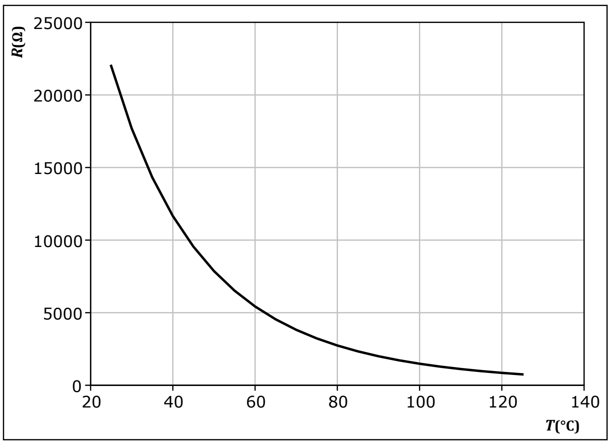
R (K/W)	τ (s)
8,42E-02	2,44E+00
2,61E-01	8,79E-02
7,08E-01	1,80E-02
2,77E-01	1,32E-03
5,21E-02	8,34E-05

Thermistor Characteristics

figure 20.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

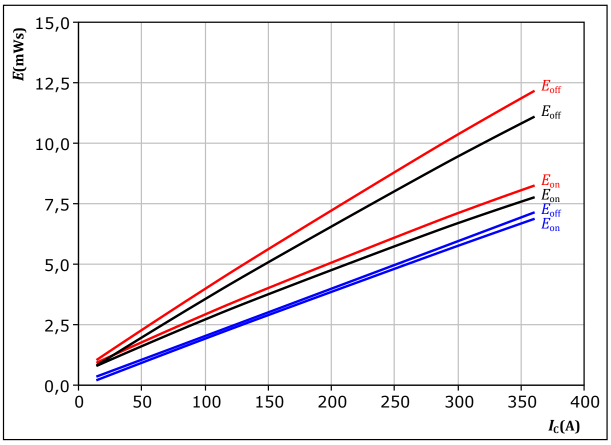


Buck Switching Characteristics

figure 21. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

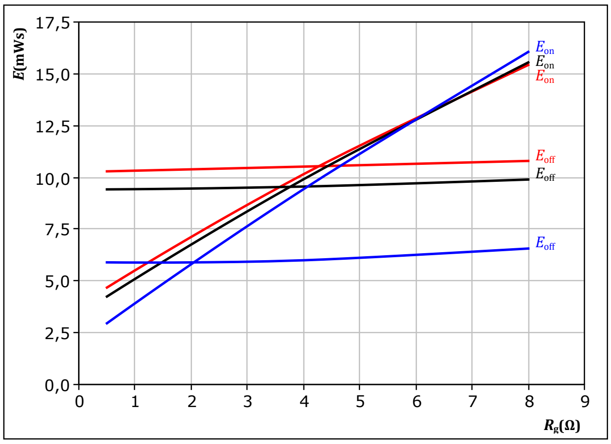
V_{CE} = 350 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 22. **IGBT**

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

E = f(R_g)



With an inductive load at

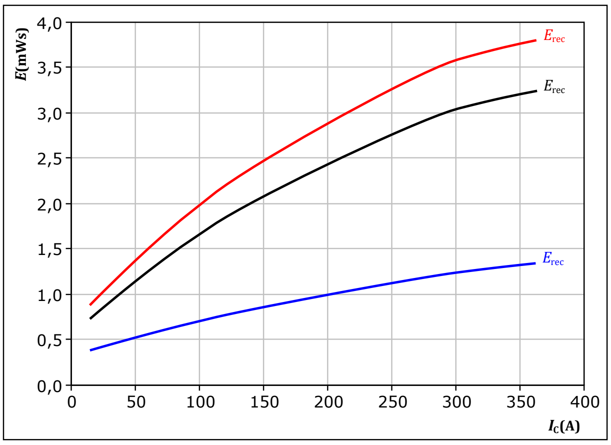
V_{CE} = 350 V
V_{GE} = ±15 V
I_C = 300 A

T_j: 25 °C / 125 °C / 150 °C

figure 23. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

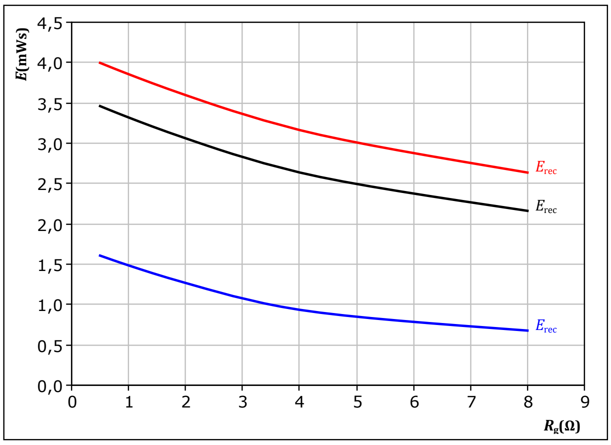
V_{CE} = 350 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j: 25 °C / 125 °C / 150 °C

figure 24. **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} = ±15 V
I_C = 300 A

T_j: 25 °C / 125 °C / 150 °C

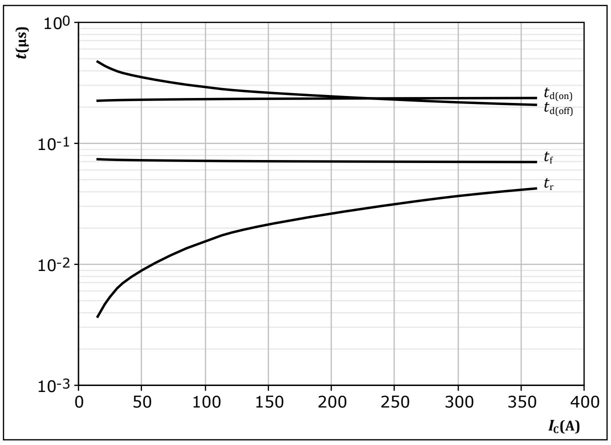
Copyright Vincotech

Buck Switching Characteristics

figure 25. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



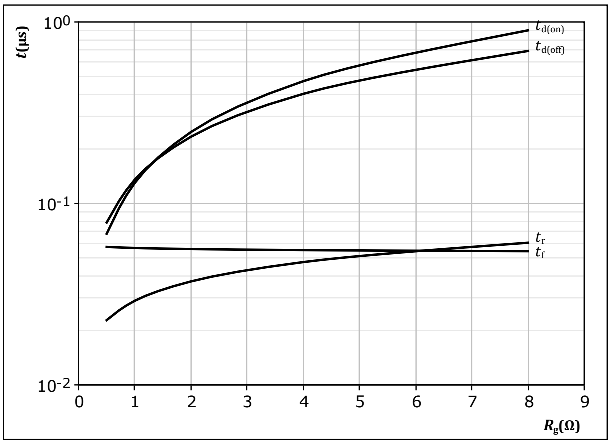
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 26. **IGBT**

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

$t = f(R_g)$



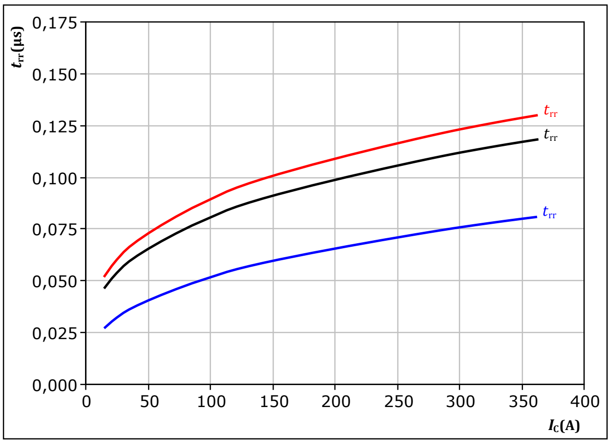
With an inductive load at

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

figure 27. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

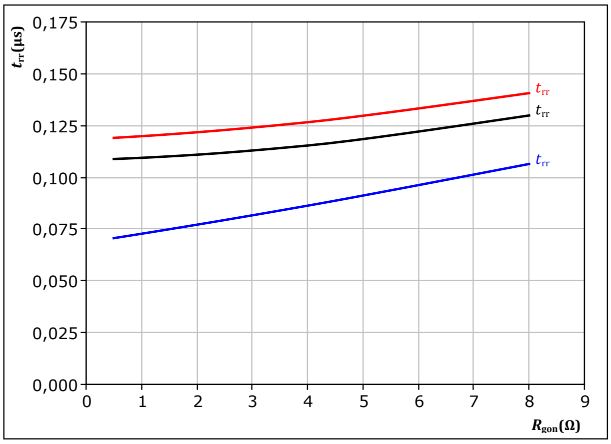
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 28. **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} =	±15	V
I_C =	300	A

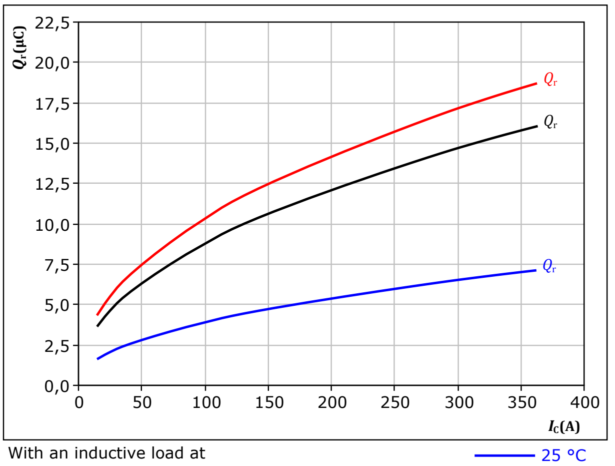
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 29. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



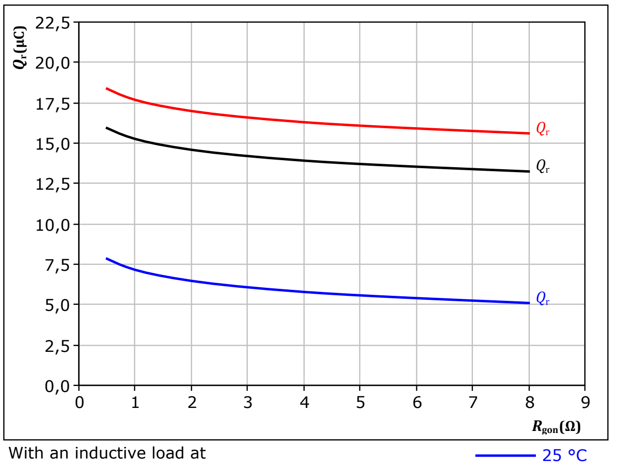
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 30. **FWD**

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

$Q_r = f(R_{gon})$



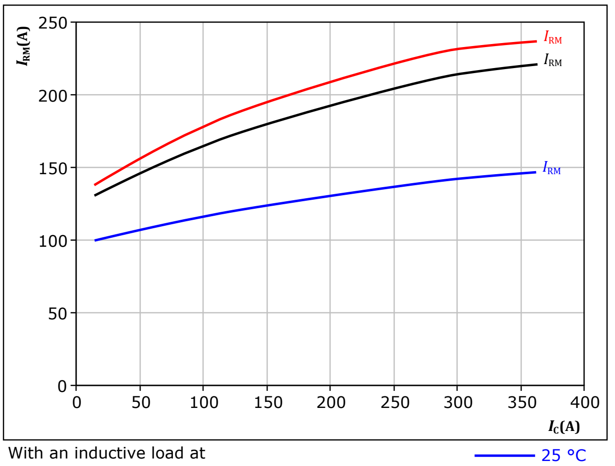
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	300	A		150 °C

figure 31. **FWD**

Typical peak reverse recovery current as a function of collector current

$I_{RM} = f(I_C)$



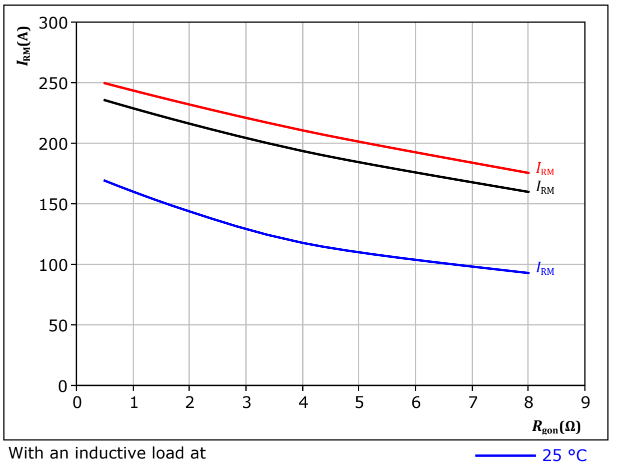
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 32. **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

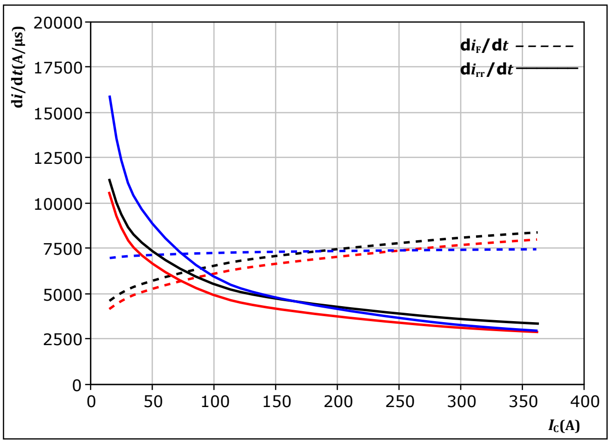
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	300	A		150 °C

Buck Switching Characteristics

figure 33. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

$di_F/dt, di_{rr}/dt = f(I_C)$



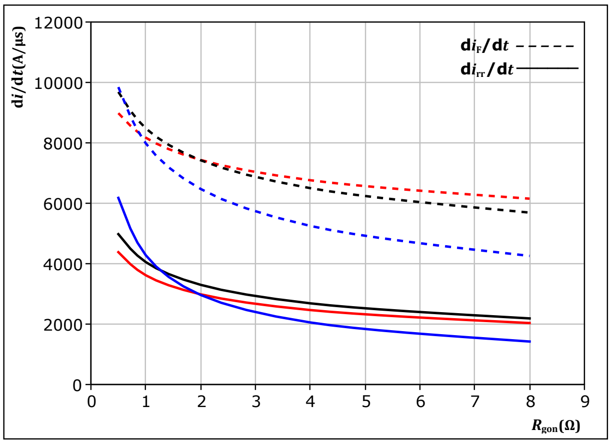
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

figure 34. **FWD**

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

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



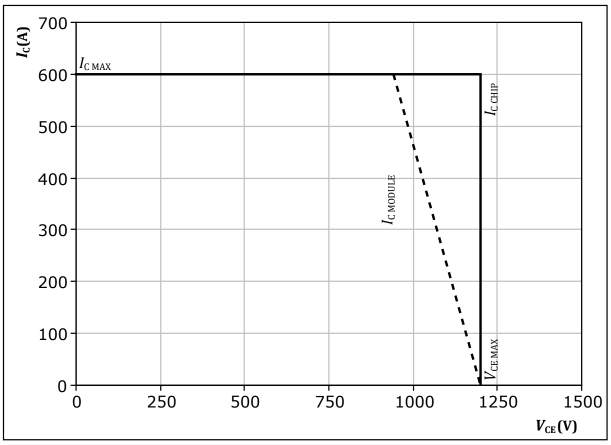
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	300	A	

figure 35. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



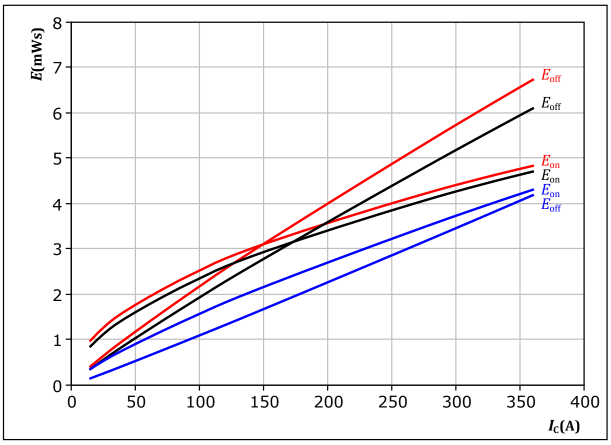
At			
	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Boost Switching Characteristics

figure 36. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

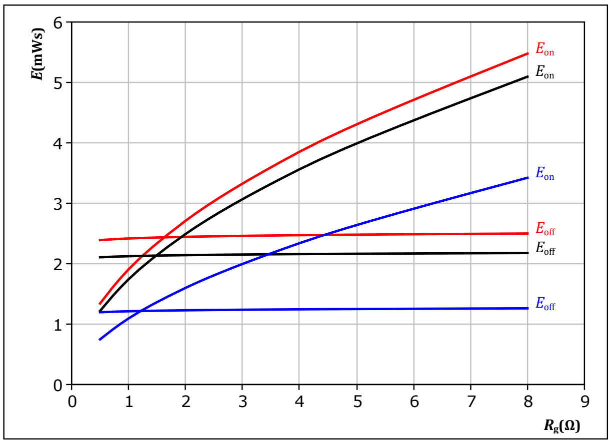
V_{CE} =	350	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	
R_{goff} =	2	Ω	

T_j: 25 °C, 125 °C, 150 °C

figure 37. **IGBT**

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

E = f(R_g)



With an inductive load at

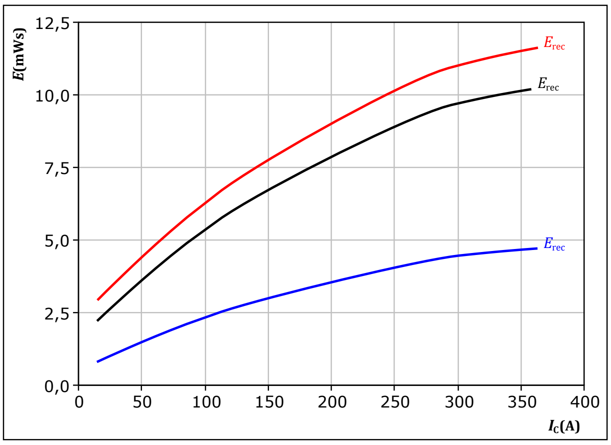
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	112,5	A

T_j: 25 °C, 125 °C, 150 °C

figure 38. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

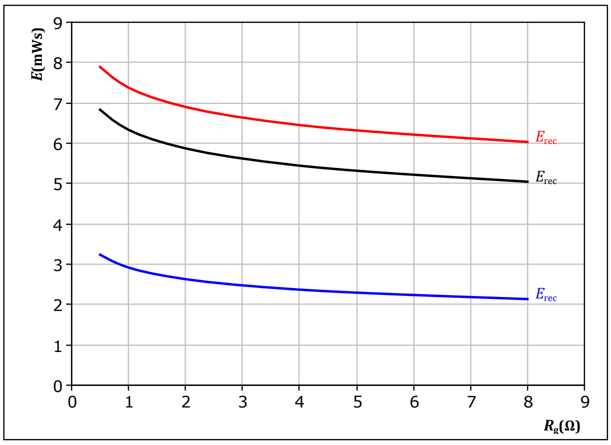
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 39. **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} =	±15	V
I_C =	112,5	A

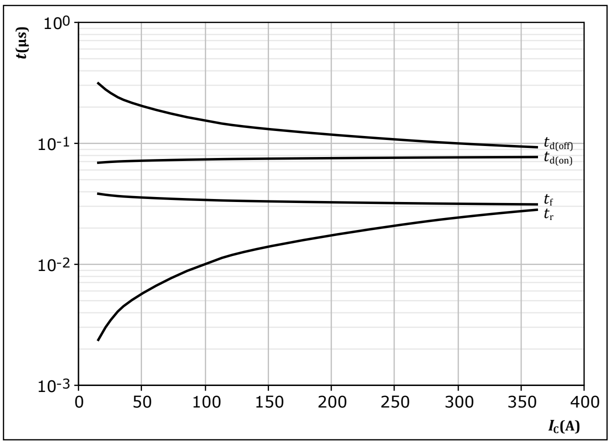
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 40. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



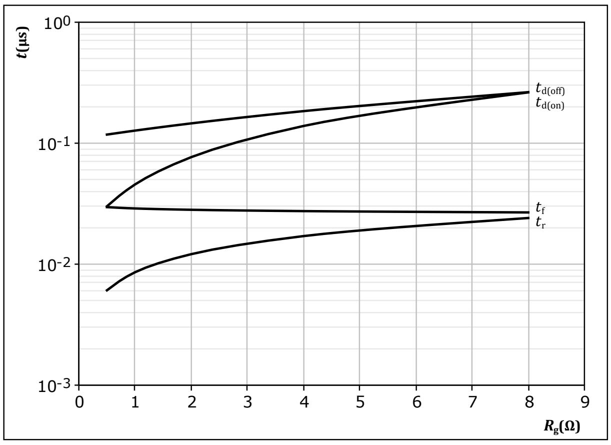
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 41. **IGBT**

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

t = f(R_g)



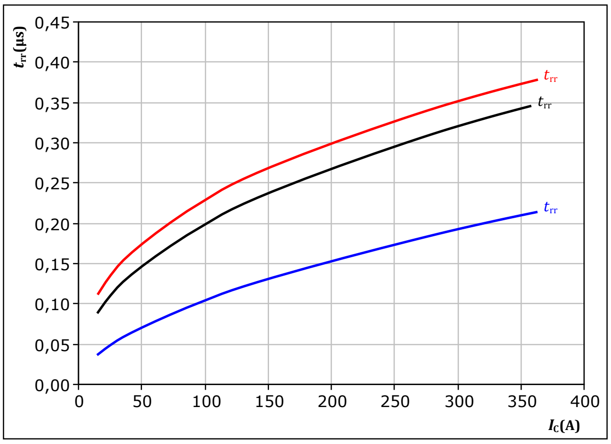
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	112,5	A

figure 42. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

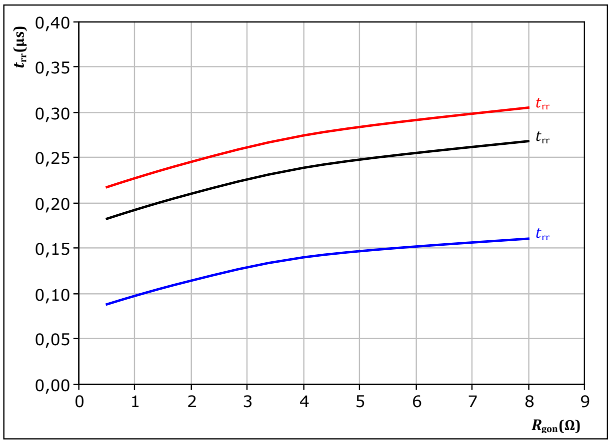
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 43. **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} =	±15	V
I_C =	112,5	A

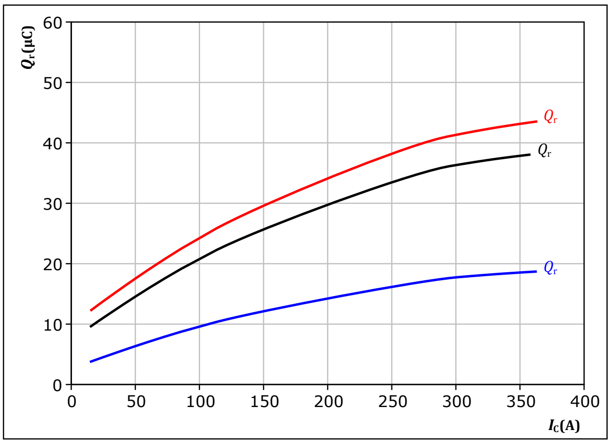
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 44. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



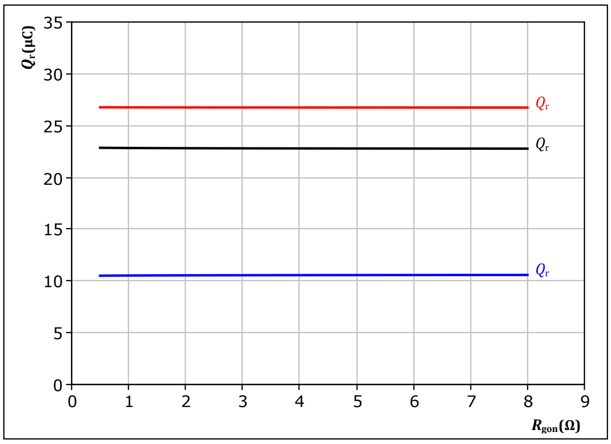
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 45. **FWD**

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

Q_r = f(R_{gon})



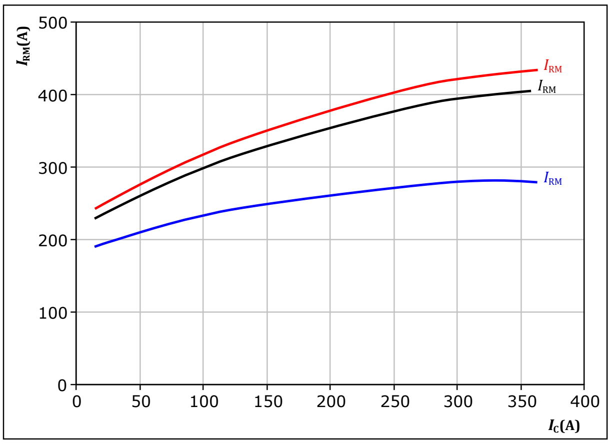
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	112,5	A		150 °C

figure 46. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



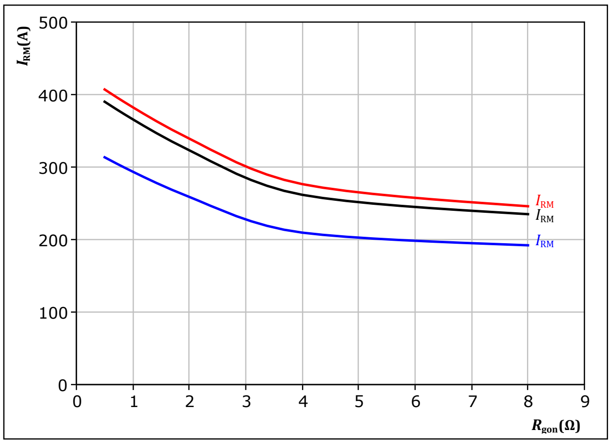
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 47. **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

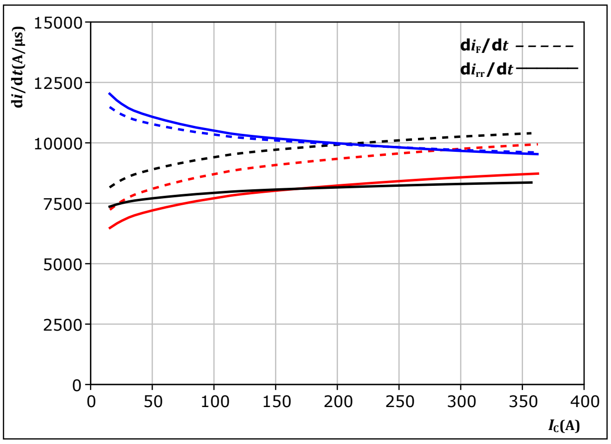
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	112,5	A		150 °C

Boost Switching Characteristics

figure 48. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

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



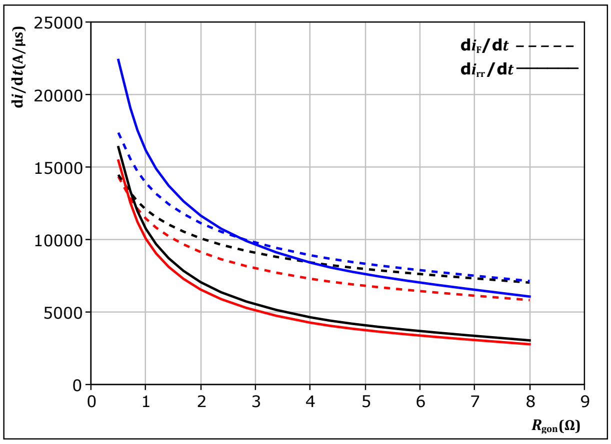
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 49. **FWD**

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

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



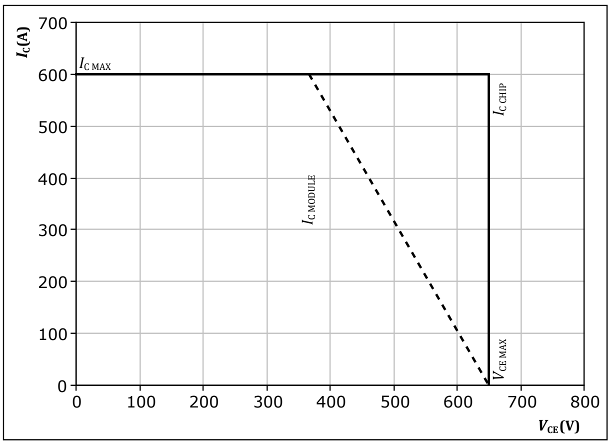
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	112,5	A		150 °C

figure 50. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



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

Switching Definitions

figure 51. **IGBT**

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

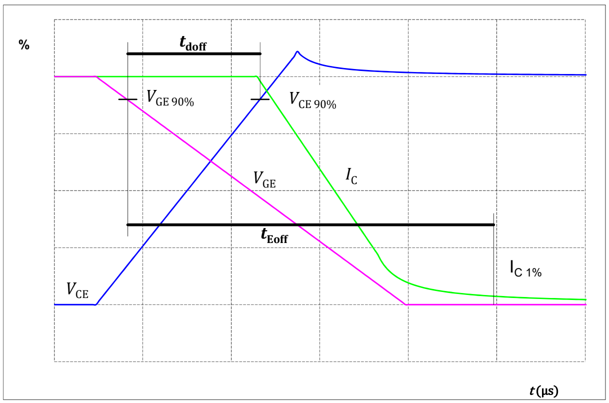


figure 52. **IGBT**

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

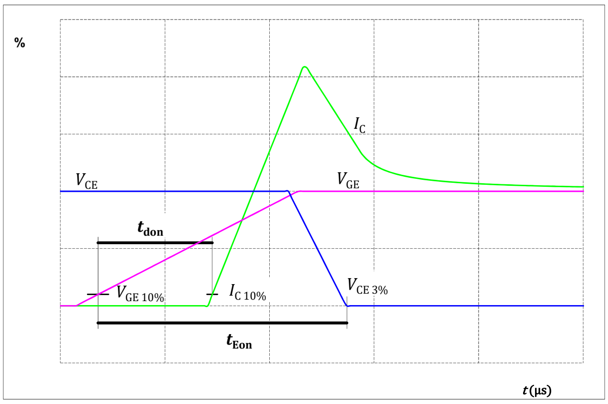


figure 53. **IGBT**

Turn-off Switching Waveforms & definition of t_f

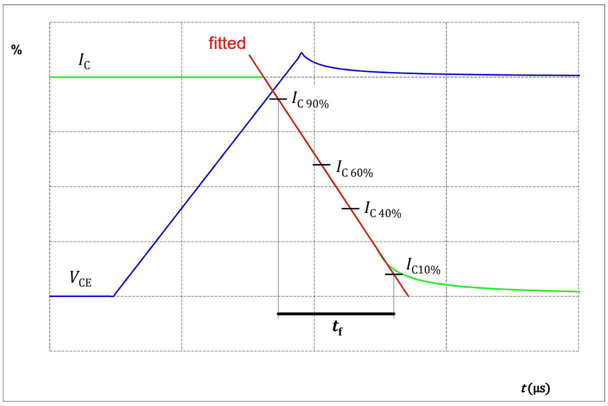
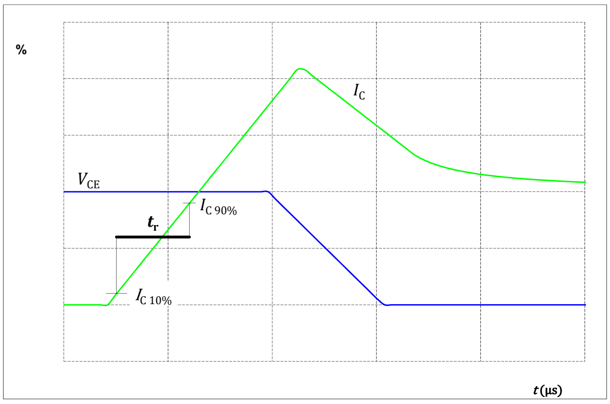


figure 54. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 55.	FWD

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

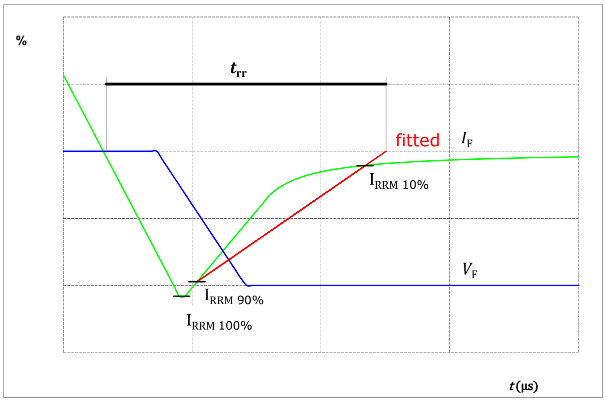
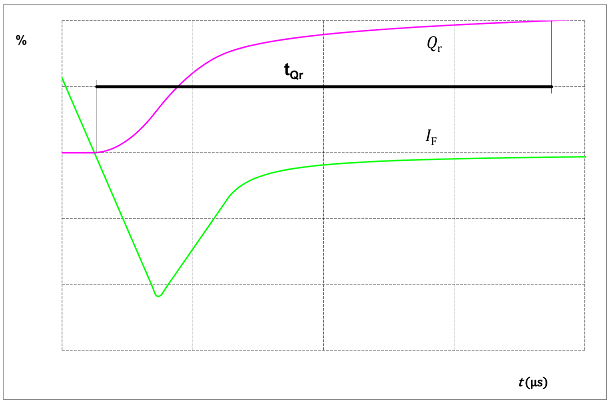


figure 56.	FWD

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



Ordering Code

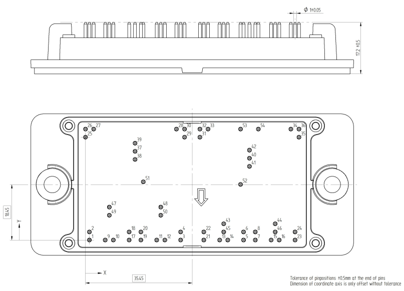
Version	Ordering Code
Without thermal paste	30-FT12NMA300H7-PL99F08
With thermal paste (3,4 W/mK, PSX-P7)	30-FT12NMA300H7-PL99F08-/3/

Marking

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

Outline

Pin table [mm]							
Pin	X	Y	Function	28	30,2	36,9	Ph11
1	1,3	0	DC-11	29	32,9	34,2	Ph11
2	1,3	2,7	DC-11	30	32,9	36,9	Ph11
3	31,6	0	DC-12	31	38	34,2	Ph12
4	31,6	2,7	DC-12	32	38	36,9	Ph12
5	52,5	0	DC-13	33	40,7	36,9	Ph12
6	52,5	2,7	DC-13	34	68,2	36,9	Ph12
7	56,4	0	DC-13	35	70,9	34,2	Ph12
8	56,4	2,7	DC-13	36	70,9	36,9	Ph12
9	6,55	0	GND11	37	16,45	29,5	G11
10	9,25	0	GND11	38	16,45	26,8	S11
11	23,65	0	GND11	39	16,45	32,2	S11
12	26,35	0	GND11	40	54,45	27,2	G12
13	44,55	0	GND12	41	54,45	24,5	S12
14	47,25	0	GND12	42	54,45	29,9	S12
15	61,65	0	GND12	43	45,9	5,4	G13-1
16	64,35	0	GND12	44	63	5,4	G13-2
17	14,5	0	DC+11	45	45,9	2,7	S13
18	14,5	2,7	DC+11	46	63	2,7	S13
19	18,4	0	DC+11	47	7,9	10,95	G14-1
20	18,4	2,7	DC+11	48	25	10,95	G14-2
21	39,3	0	DC+12	49	7,9	8,25	S14
22	39,3	2,7	DC+12	50	25	8,25	S14
23	69,6	0	DC+13	51	19,2	19,35	C14
24	69,6	2,7	DC+13	52	51,5	18,5	C13
25	0	34,2	Ph11	53	51,5	36,9	Therm1
26	0	36,9	Ph11	54	57,4	36,9	Therm2
27	2,7	36,9	Ph11				



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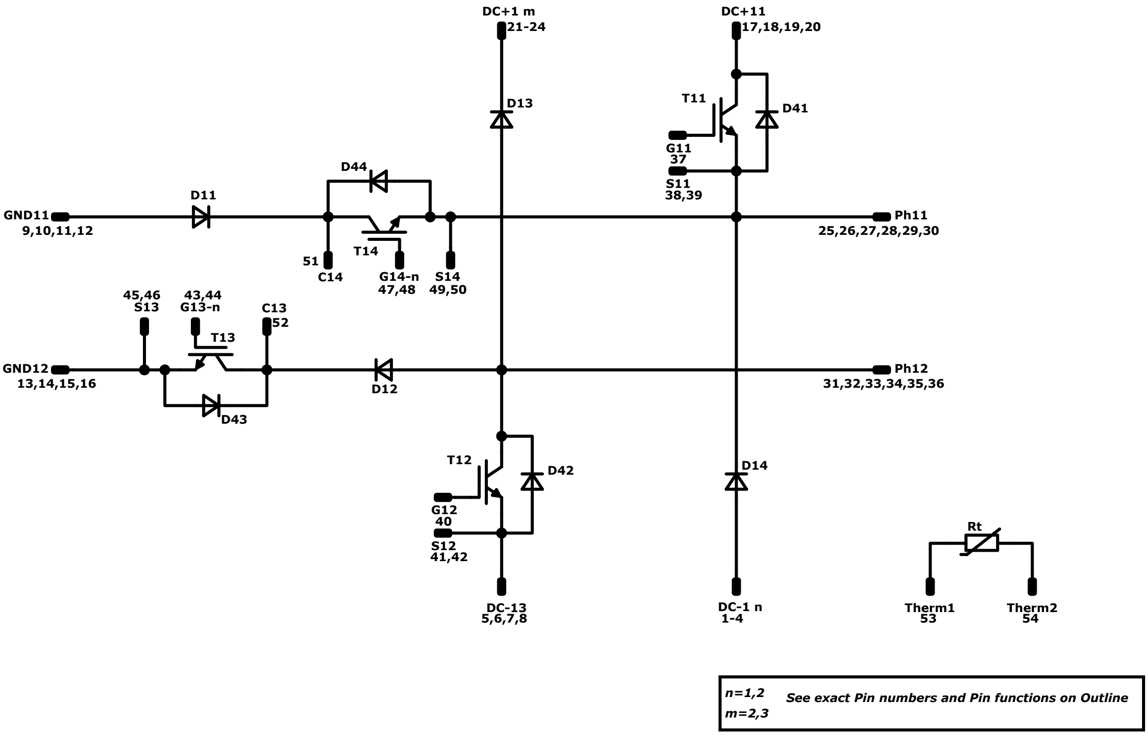
30-FT12NMA300H7-PL99F08
datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	300 A	Buck Switch	
D11, D12	FWD	650 V	300 A	Buck Diode	
D41, D42	FWD	1200 V	16 A	Buck Sw. Protection Diode	
T13, T14	IGBT	650 V	300 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14	FWD	1200 V	300 A	Boost Diode	
D43, D44	FWD	650 V	16 A	Boost Sw. Protection Diode	
Rt	Thermistor			Thermistor	

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Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 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°C and up to 3500VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-FT12NMA300H7-PL99F08-D1-14	6 Jun. 2024	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.