Vincotech

30-FT10NIA375F9-LQ08F08

datasheet

***flow*NPC 2** **1500 V / 375 A**

Features

- High speed IGBT
- Integrated NTC
- Three-level high efficient topology

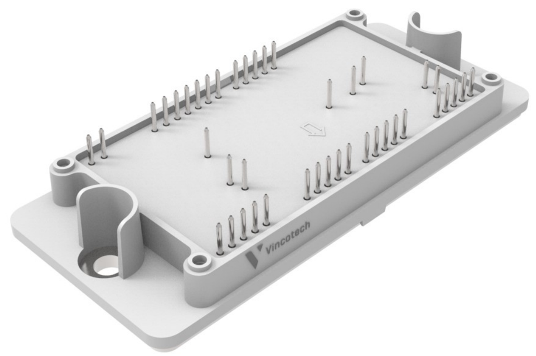
Target applications

- Solar Inverters

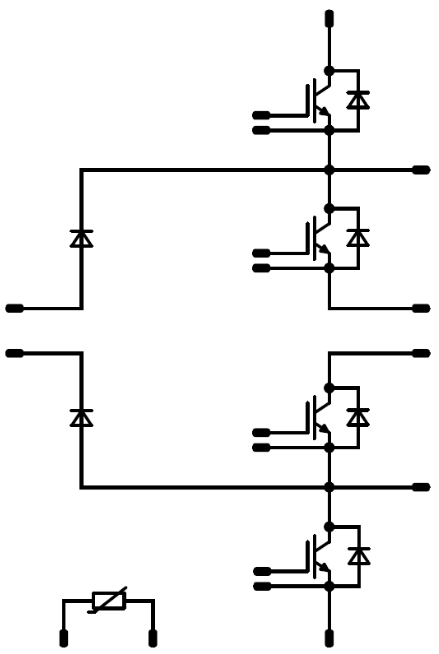
Types

- 30-FT10NIA375F9-LQ08F08

flow 2 13 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
NPC BUCK Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	219	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		1125	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	431	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
NPC BUCK Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	104	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		455	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms		650	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	218	W
Maximum junction temperature	T_{jmax}			175	°C
NPC BOOST Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	243	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	337	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
NPC BOOST Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	129	A
Surge (non-repetitive) forward current	I_{FSM}		T_j = 25 °C	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	225	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw. Inv. Diode					
Peak repetitive reverse voltage	V_{RRM}			950	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	129	A
Surge (non-repetitive) forward current	I_{FSM}		T_j = 25 °C	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	225	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 s	4000	V
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative Tracking Index	CTI			600	

*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]	Values Min	Typ	Max	Unit
NPC BUCK Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,38	25	3,2	4,67	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		375	25 125 150		1,98 2,32 2,42	2,11	V
Collector-emitter cut-off current	I_{CES}		0	950		25			1250	µA
Gate-emitter leakage current	I_{GES}		20	0		25			2000	nA
Internal gate resistance	r_g							0,342		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	30		25		25025		pF
Output capacitance	C_{oes}							486,5		pF
Reverse transfer capacitance	C_{res}							110		pF
Gate charge	Q_g		15	600	375	25		735		nC
Thermal										
Thermal resistance junction to sink*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,22		K/W

*Only valid with pre-applied Vincotech thermal interface material.

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	140	25 125 150		85 85,8 85,8		ns
Rise time	t_r					25 125 150		18 21 22,2		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		141,8 181,4 190,4		ns
Fall time	t_f					25 125 150		11,76 13,4 14,45		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,826 µC Q_{rFWD}=0,855 µC Q_{rFWD}=0,823 µC				25 125 150		1,84 2,37 2,5		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,45 6,5 7,26		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	
NPC BUCK Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,51 1,77 1,91	1,8	V
Reverse leakage current	I_R	V_r = 1200 V				25		175	1000	µA
Thermal										
Thermal resistance junction to sink*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,44		K/W

*Only valid with pre-applied Vincotech thermal interface material.

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Dynamic										
Peak recovery current	I_{RRM}	d*i*/d*t*=6030 A/µs d*i*/d*t*=4960 A/µs d*i*/d*t*=3968 A/µs	±15	600	140	25 125 150		55,05 51 48,74		A
Reverse recovery time	t_{rr}					25 125 150		25,81 27 26,5		ns
Recovered charge	Q_r					25 125 150		0,826 0,855 0,823		µC
Reverse recovered energy	E_{rec}					25 125 150		0,214 0,235 0,214		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5364 4961 4299		A/µs

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
NPC BOOST Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,3	25	3,2	4,36	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		300	25 125 150		1,35 1,44 1,47	1,69	V
Collector-emitter cut-off current	I_{CES}		0	950		25			1000	µA
Gate-emitter leakage current	I_{GES}		20	0		25			1600	nA
Internal gate resistance	r_g							0,462		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	30		25		60600		pF
Output capacitance	C_{oes}							496		pF
Reverse transfer capacitance	C_{res}							99,6		pF
Gate charge	Q_g		15	600	300	25		2772		nC
Thermal										
Thermal resistance junction to sink*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,28		K/W

*Only valid with pre-applied Vincotech thermal interface material.

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
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	140	25 125 150		275,6 279 282		ns
Rise time	t_r					25 125 150		25,2 30,4 31,6		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		387,4 451,2 466,2		ns
Fall time	t_f					25 125 150		15,81 21,33 23,87		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=6,9 µC Q_{rFWD}=15,84 µC Q_{rFWD}=17,57 µC				25 125 150		3,31 5,62 6,1		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		8,15 11,7 13,81		mWs

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
NPC BOOST Diode										
Static										
Forward voltage	V_F				150	25 125 150		2,12 1,96 1,91	2,51	V
Reverse leakage current	I_R	V_r = 950 V				25		0,6	20	µA
Thermal										
Thermal resistance junction to sink*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,42		K/W

*Only valid with pre-applied Vincotech thermal interface material.

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
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		156,22 189,13 185,09		A
Reverse recovery time	t_{rr}					25 125 150		93,33 183,91 214,98		ns
Recovered charge	Q_r	di/dt=5040 A/µs di/dt=4818 A/µs di/dt=4168 A/µs	±15	600	140	25 125 150		6,9 15,84 17,57		µC
Reverse recovered energy	E_{rec}					25 125 150		2,54 6,02 6,74		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		5304 2784 2401		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. Inv. Diode										
Static										
Forward voltage	V_F				150	25 125 150		2,12 1,96 1,91	2,51	V
Reverse leakage current	I_R	V_r = 950 V				25		0,6	20	µA
Thermal										
Thermal resistance junction to sink*	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,42		K/W

*Only valid with pre-applied Vincotech thermal interface material.

Thermistor

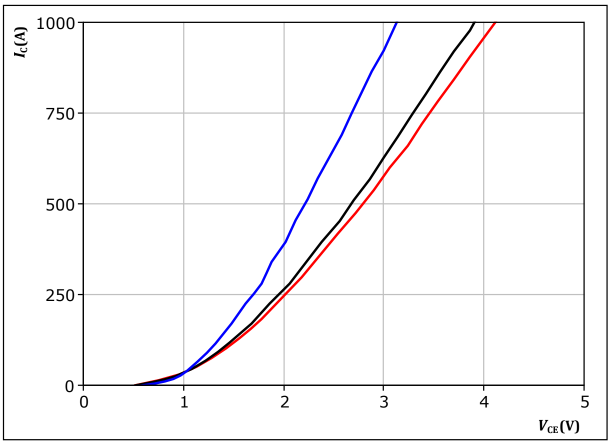
Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Static										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P							5		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

NPC BUCK Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

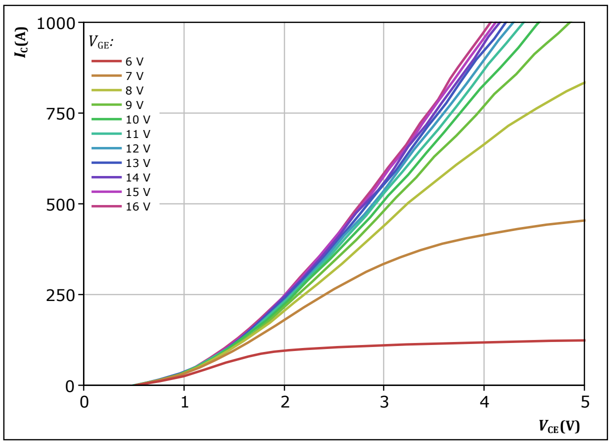


t_p =	250	μs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$



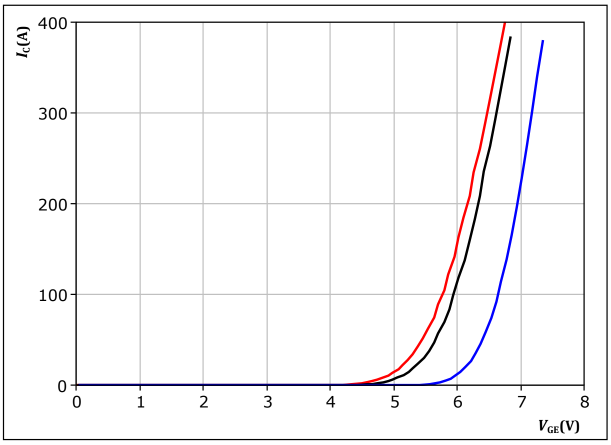
t_p =	250	μs
T_j =	150	°C

V_{GE} from 6 V to 16 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

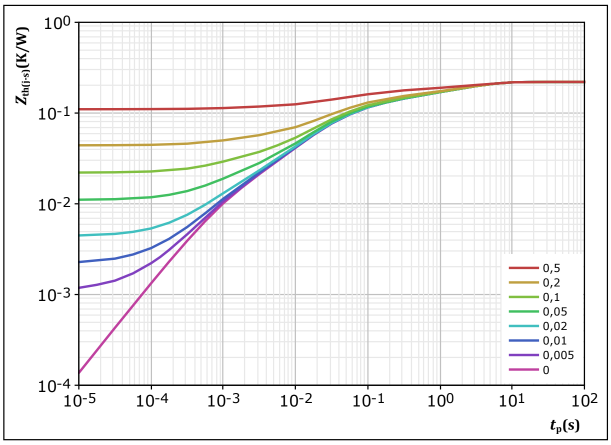


t_p =	250	μs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,22	K/W

IGBT thermal model values

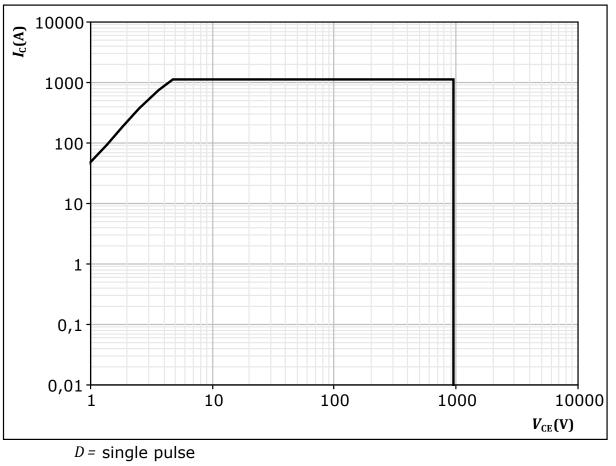
R (K/W)	τ (s)
6,42E-02	2,97E+00
3,34E-02	4,99E-01
7,02E-02	6,64E-02
4,25E-02	1,52E-02
1,02E-02	1,04E-03

NPC 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

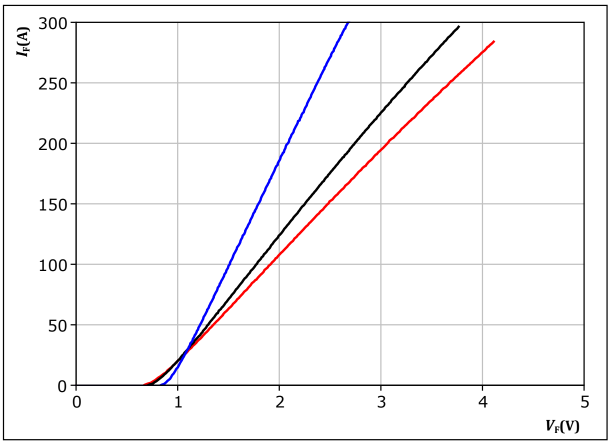
T_j = T_{jmax}

NPC BUCK Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



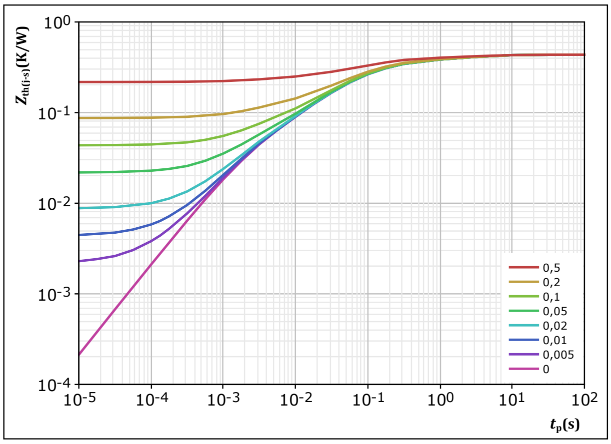
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,435 K/W

IGBT thermal model values

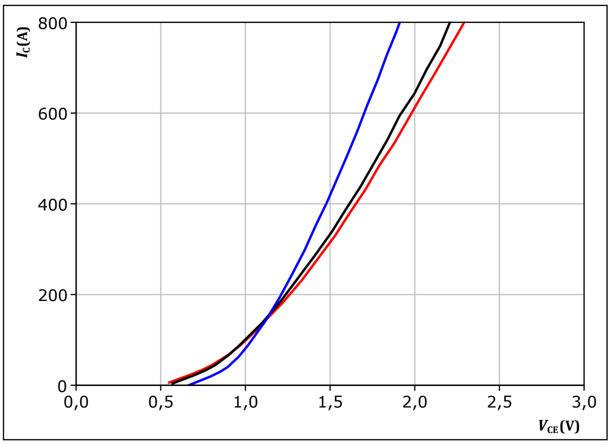
R (K/W)	τ (s)
4,84E-02	4,17E+00
7,23E-02	5,54E-01
2,07E-01	8,33E-02
7,86E-02	1,63E-02
2,91E-02	2,09E-03

NPC BOOST Switch Characteristics

figure 8. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

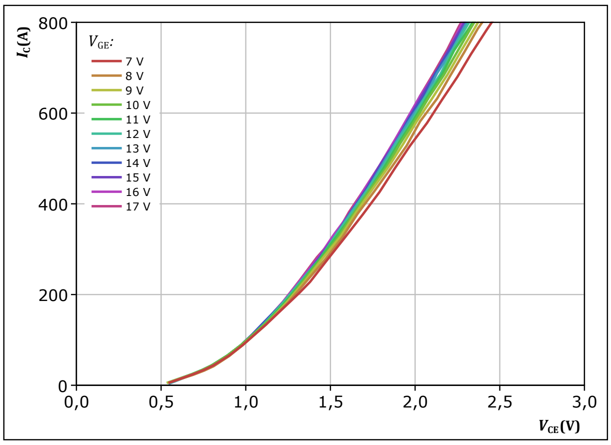


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 9. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

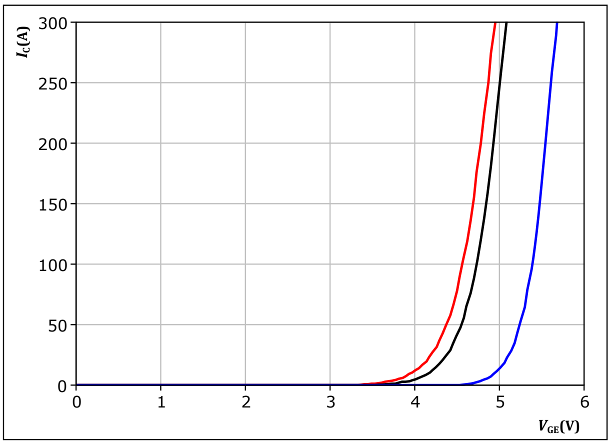


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

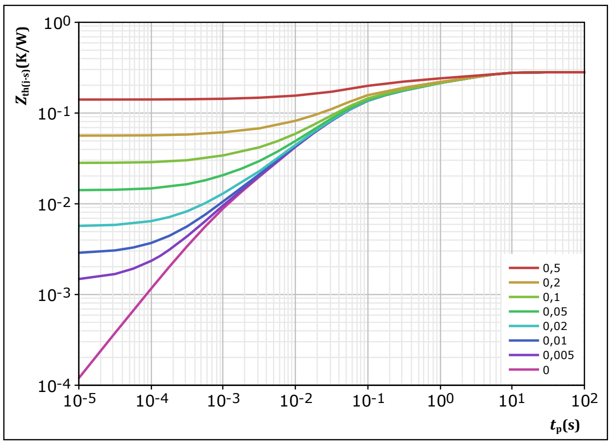


t_p = 250 µs
V_{CE} = 10 V
T_j: 25 °C, 125 °C, 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



D = t_p / T
$R_{th(j-s)}$ = 0,282 K/W

IGBT thermal model values

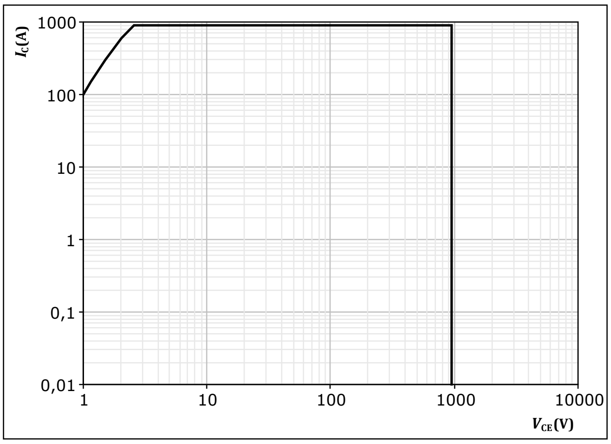
R (K/W)	τ (s)
8,41E-02	3,27E+00
6,01E-02	4,16E-01
1,10E-01	5,26E-02
2,23E-02	7,99E-03
5,87E-03	8,42E-04

NPC BOOST Switch Characteristics

figure 12.	IGBT

Safe operating area

I_C = f(V_{CE})



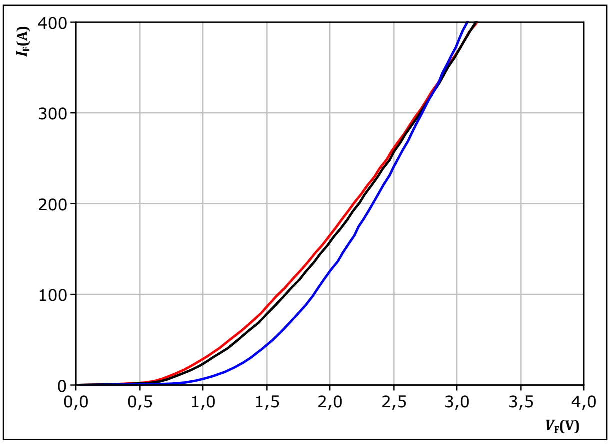
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

NPC BOOST Diode Characteristics

figure 13. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



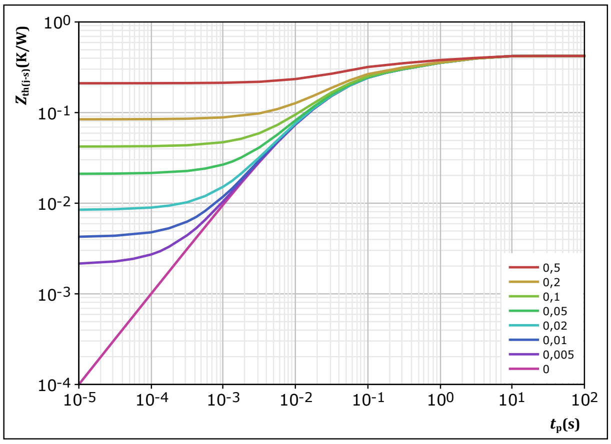
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 14. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,422 K/W

IGBT thermal model values

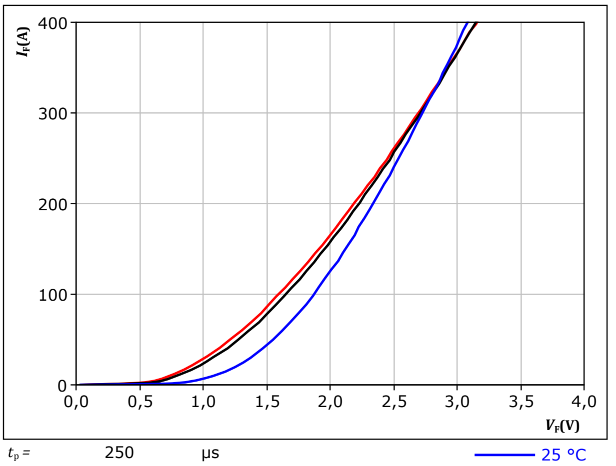
R (K/W)	τ (s)
9,85E-02	2,34E+00
9,72E-02	2,93E-01
1,74E-01	4,17E-02
3,69E-02	8,10E-03
1,49E-02	1,63E-02

Boost Sw. Inv. Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



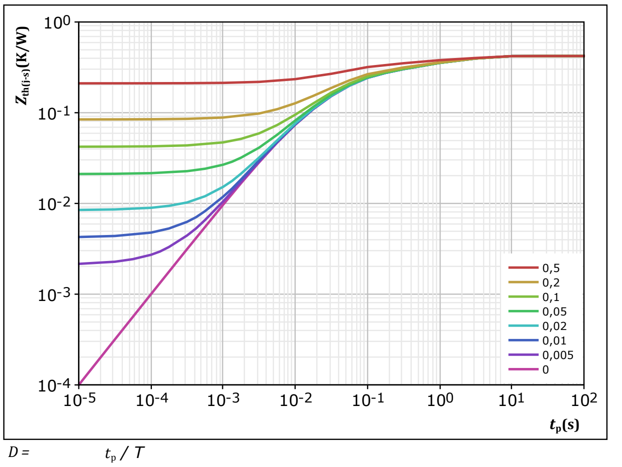
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,422 K/W

IGBT thermal model values

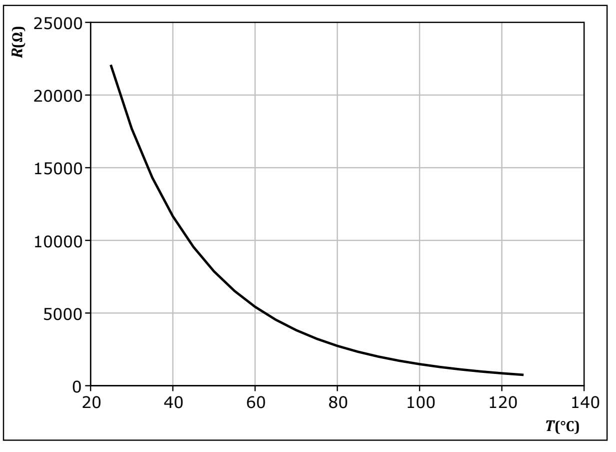
R (K/W)	τ (s)
9,85E-02	2,34E+00
9,72E-02	2,93E-01
1,74E-01	4,17E-02
3,69E-02	8,10E-03
1,49E-02	1,63E-02

Thermistor Characteristics

figure 17.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

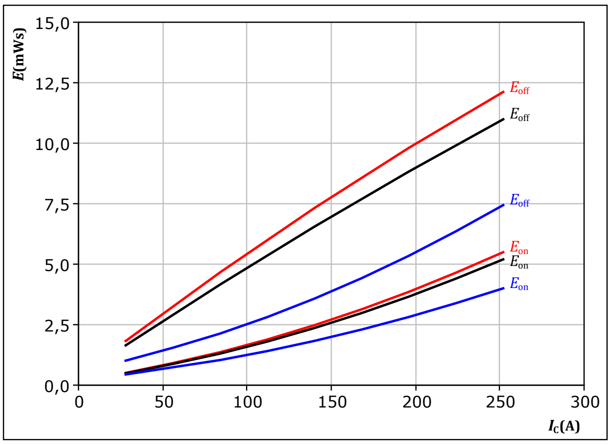


NPC BUCK Switching Characteristics

figure 18. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



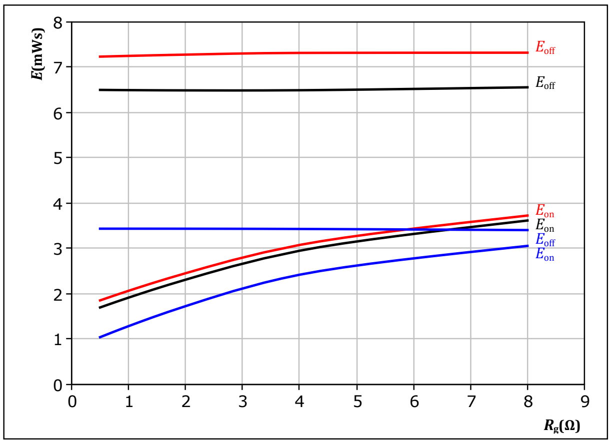
With an inductive load at

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

figure 19. **IGBT**

Typical switching energy losses as a function of gate resistor

E = f(R_g)



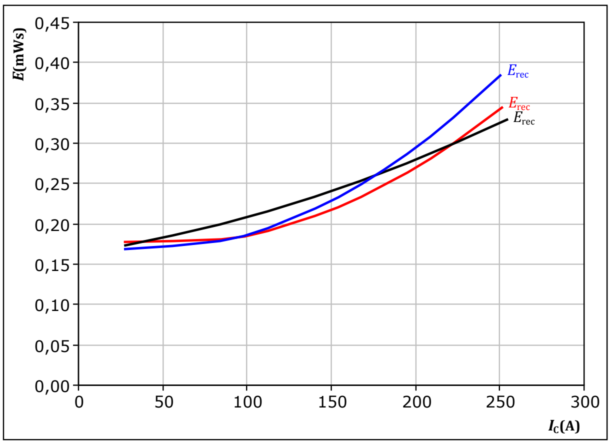
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

figure 20. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



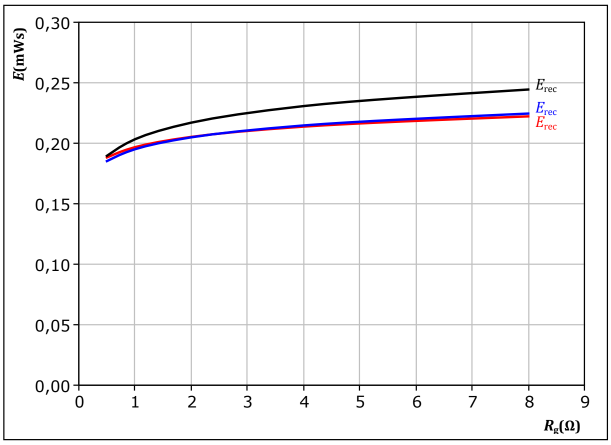
With an inductive load at

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

figure 21. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

E_{rec} = f(R_g)



With an inductive load at

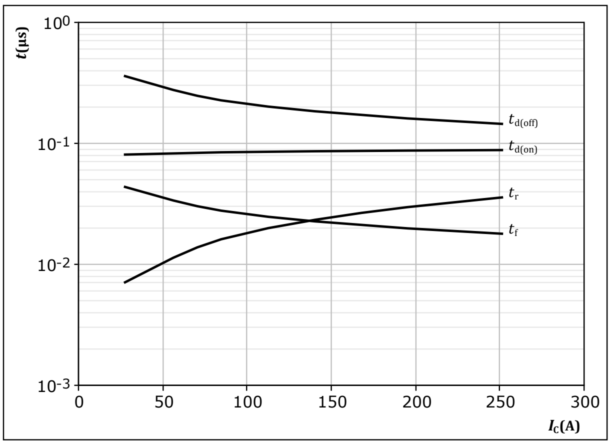
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

NPC BUCK Switching Characteristics

figure 22. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



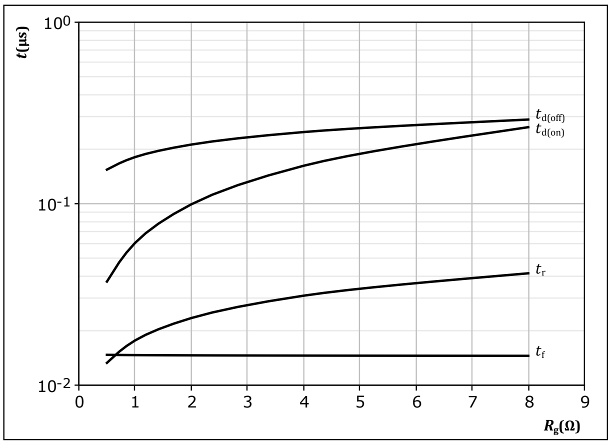
With an inductive load at

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

figure 23. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



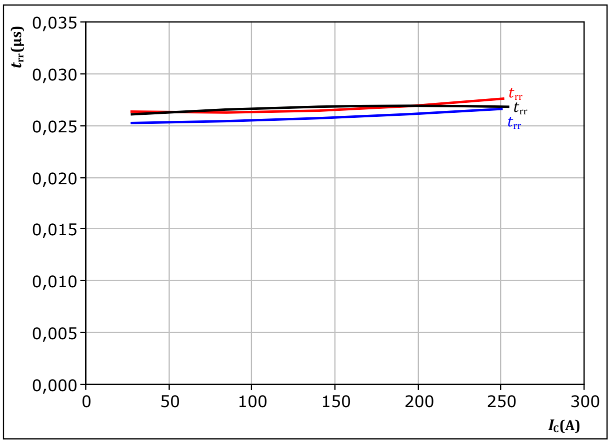
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	140	A

figure 24. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

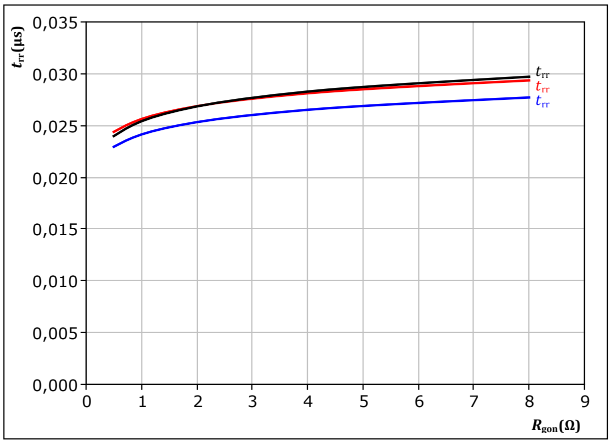
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 25. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	140	A

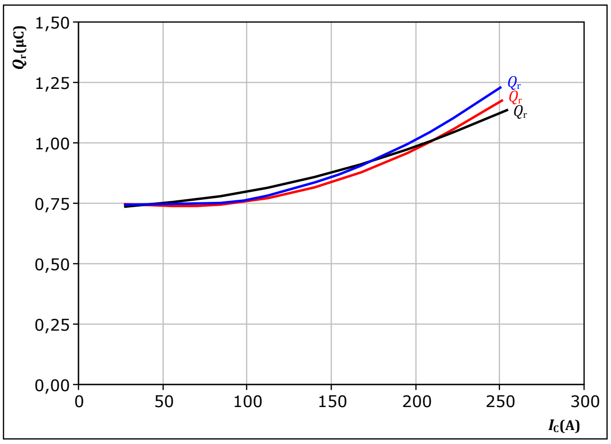
T_j: 25 °C, 125 °C, 150 °C

NPC BUCK Switching Characteristics

figure 26. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

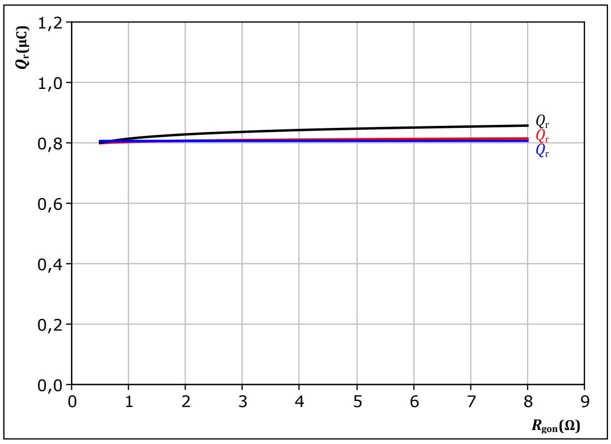
R_{gon} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 27. FWD

Typical recovered charge as a function of turn on gate resistor

Q_r = f(R_{gon})



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

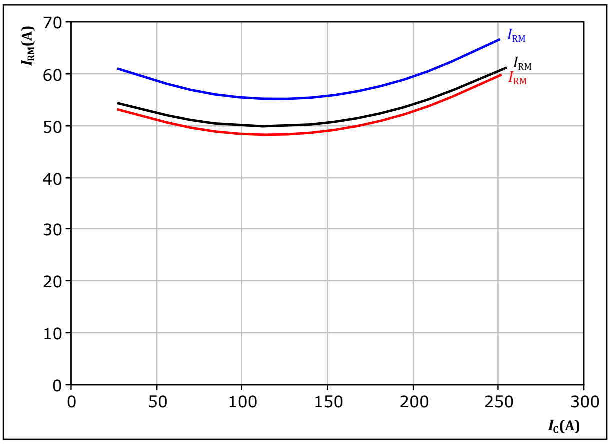
I_C = 140 A

T_j: 25 °C, 125 °C, 150 °C

figure 28. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

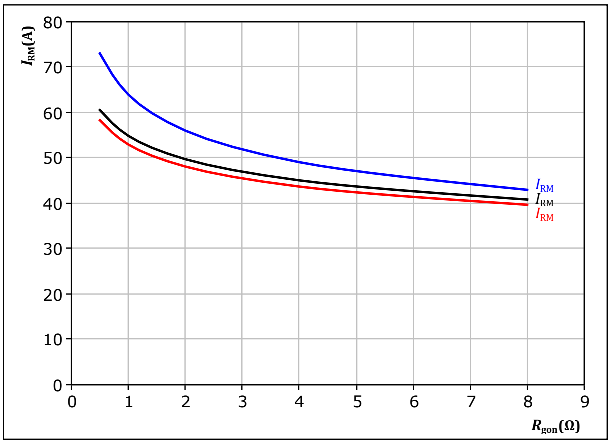
R_{gon} = 2 Ω

T_j: 25 °C, 125 °C, 150 °C

figure 29. FWD

Typical peak reverse recovery current as a function of turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

V_{CE} = 600 V

V_{GE} = ±15 V

I_C = 140 A

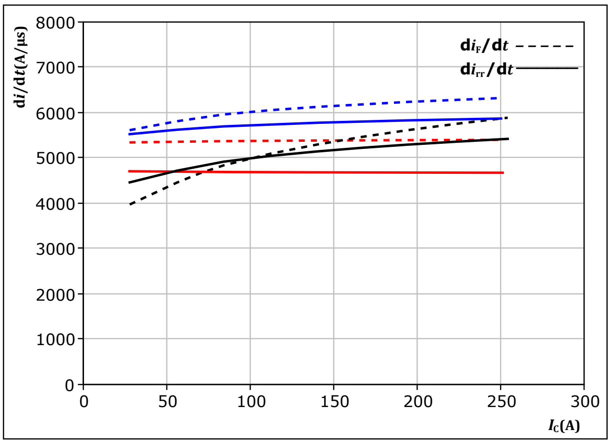
T_j: 25 °C, 125 °C, 150 °C

NPC BUCK Switching Characteristics

figure 30. **FWD**

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

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



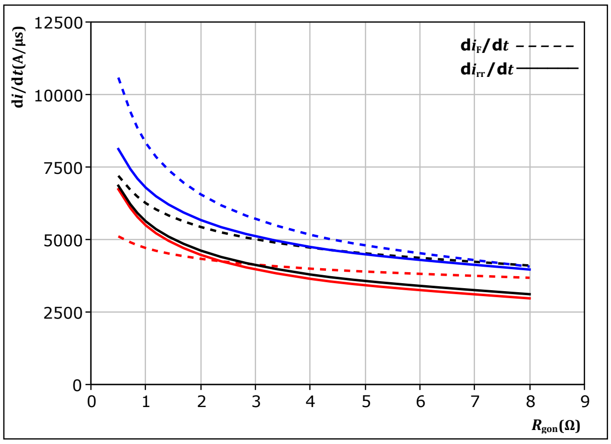
With an inductive load at

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

figure 31. **FWD**

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

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



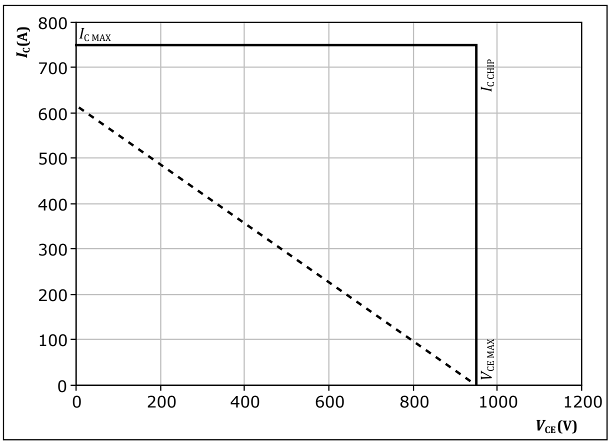
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

figure 32. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



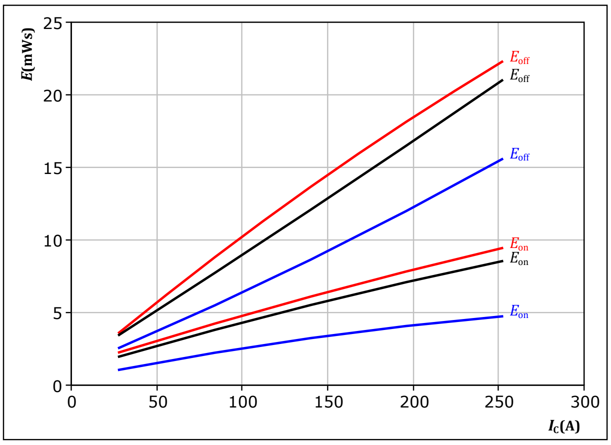
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

NPC BOOST Switching Characteristics

figure 33. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



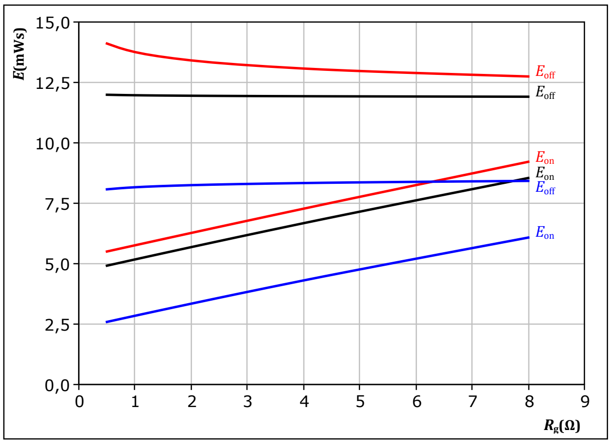
With an inductive load at

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

figure 34. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



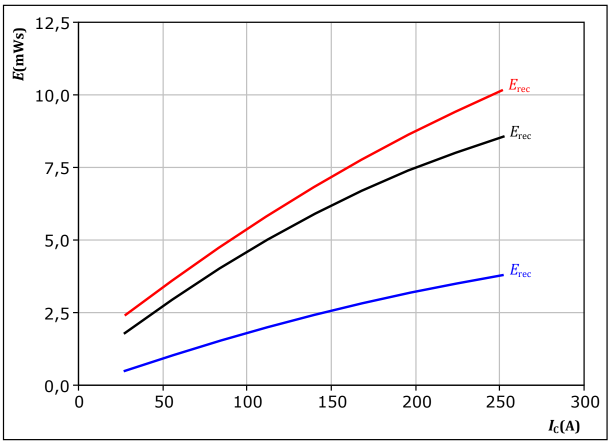
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

figure 35. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



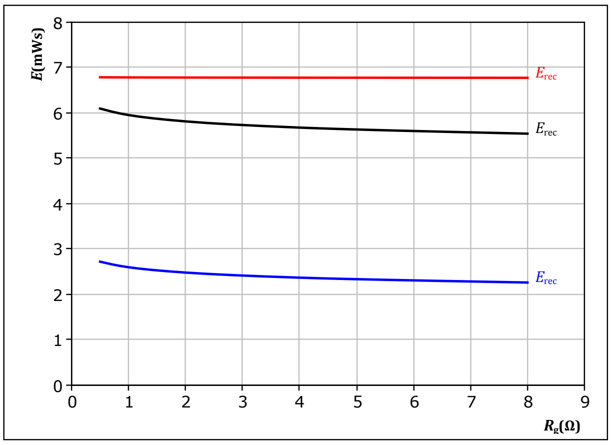
With an inductive load at

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

figure 36. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

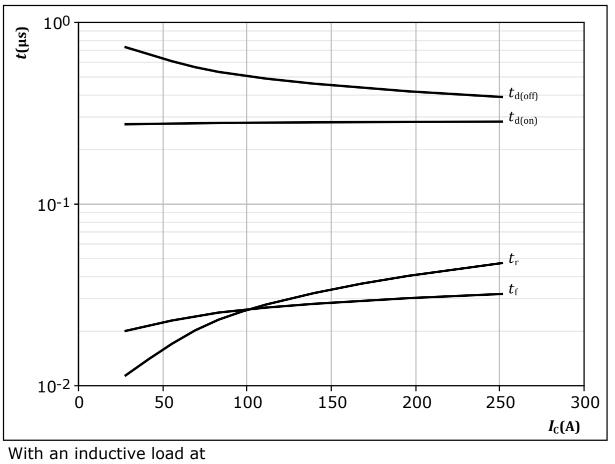
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

NPC BOOST Switching Characteristics

figure 37.	IGBT

Typical switching times as a function of collector current

t = f(I_C)



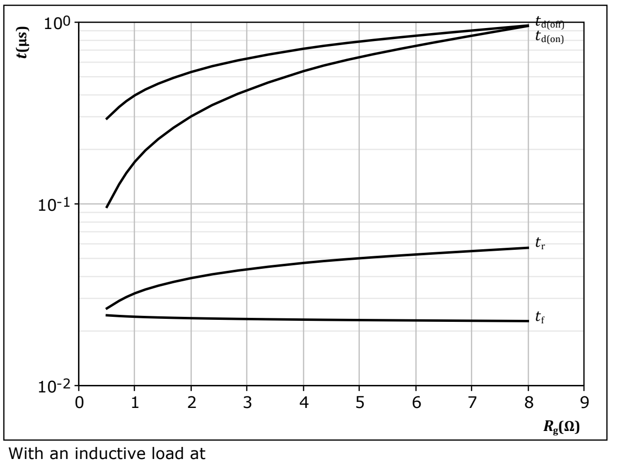
With an inductive load at

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

figure 38.	IGBT

Typical switching times as a function of gate resistor

t = f(R_g)



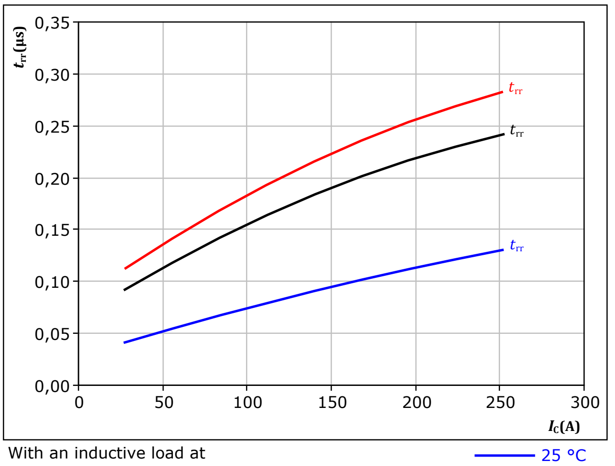
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	140	A

figure 39.	FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

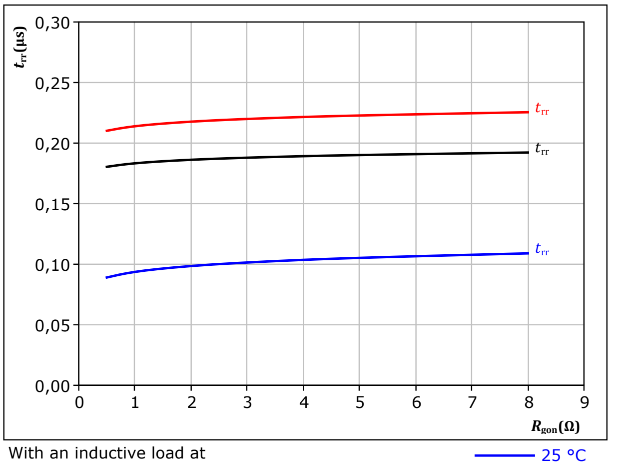
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 40.	FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

t_{rr} = f(R_{gon})



With an inductive load at

V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	140	A

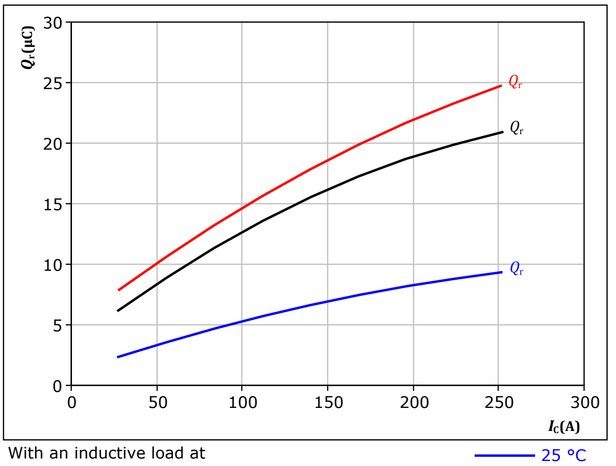
T_j: 25 °C, 125 °C, 150 °C

NPC BOOST Switching Characteristics

figure 41. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



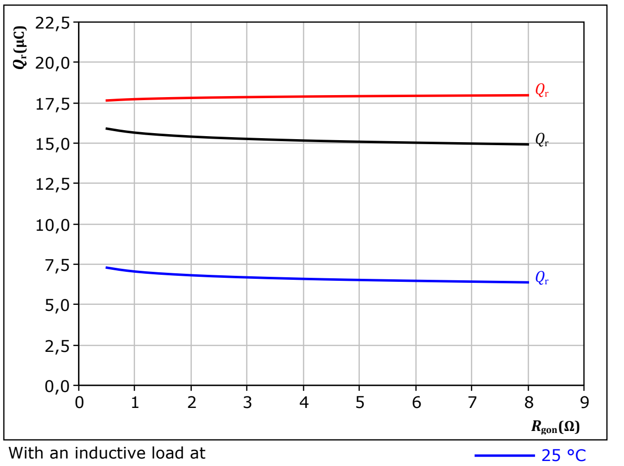
With an inductive load at

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

figure 42. FWD

Typical recovered charge as a function of turn on gate resistor

Q_r = f(R_{gon})



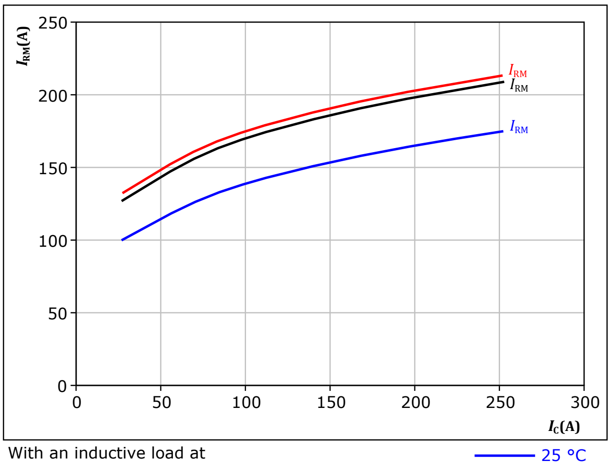
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	140	A	

figure 43. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



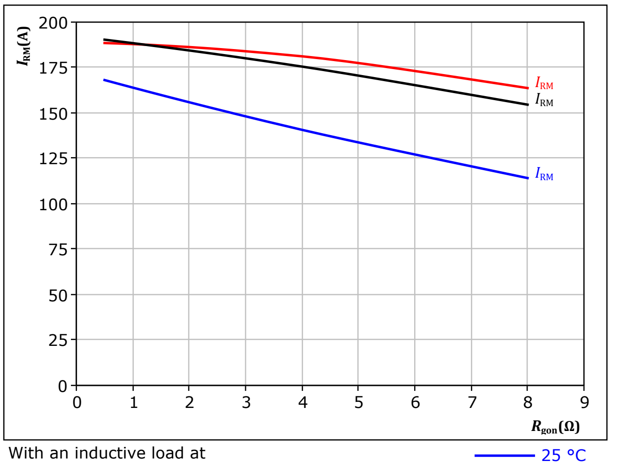
With an inductive load at

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

figure 44. FWD

Typical peak reverse recovery current as a function of turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

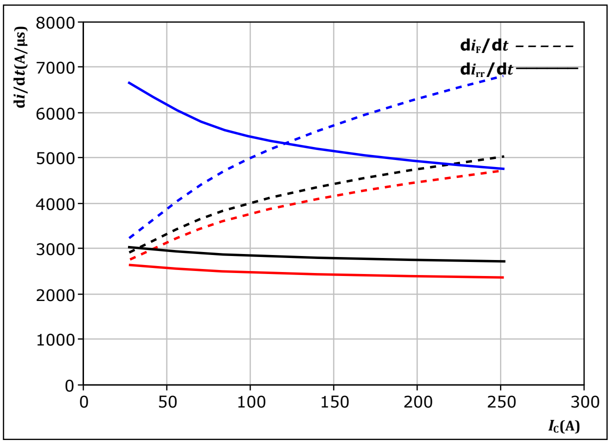
V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	140	A	

NPC BOOST Switching Characteristics

figure 45. **FWD**

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

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



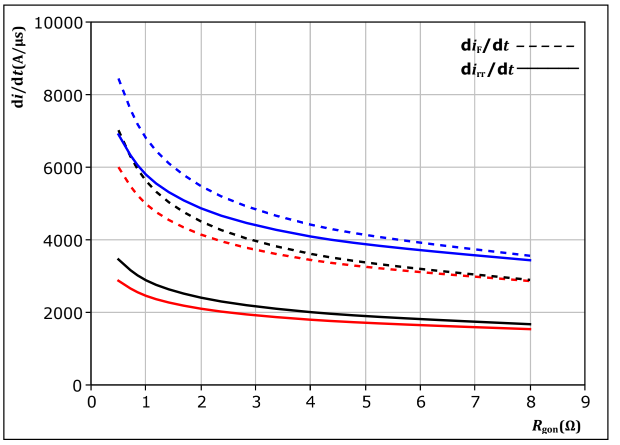
With an inductive load at

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

figure 46. **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})



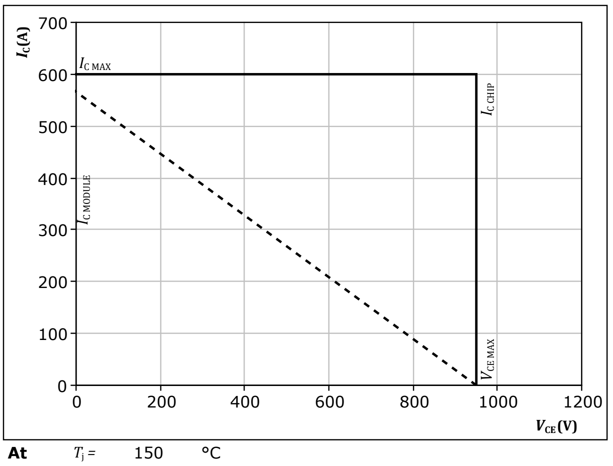
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	140	A		150 °C

figure 47. **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 48. **IGBT**

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

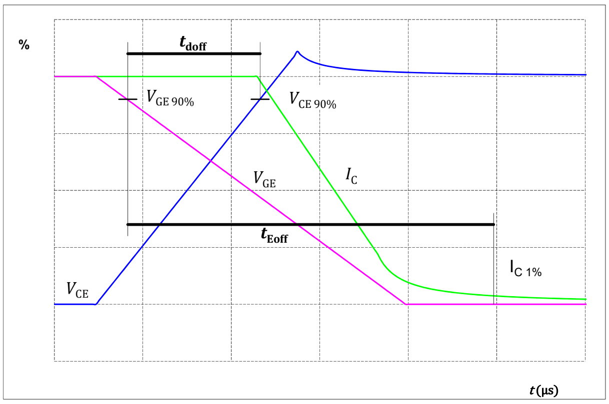


figure 49. **IGBT**

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

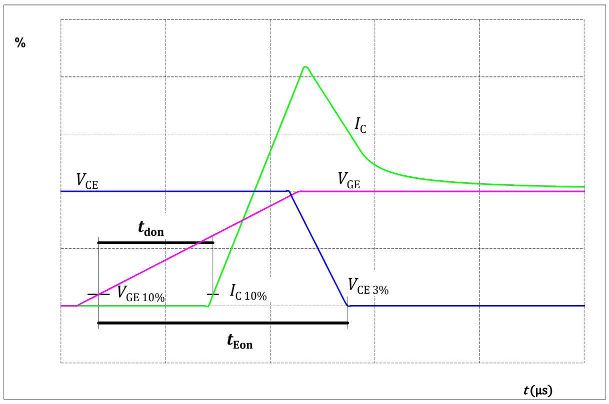


figure 50. **IGBT**

Turn-off Switching Waveforms & definition of t_f

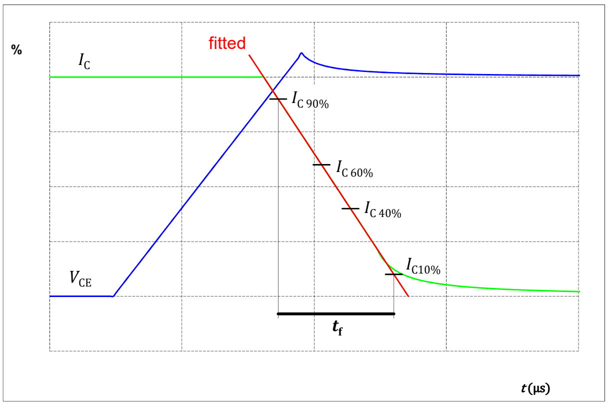
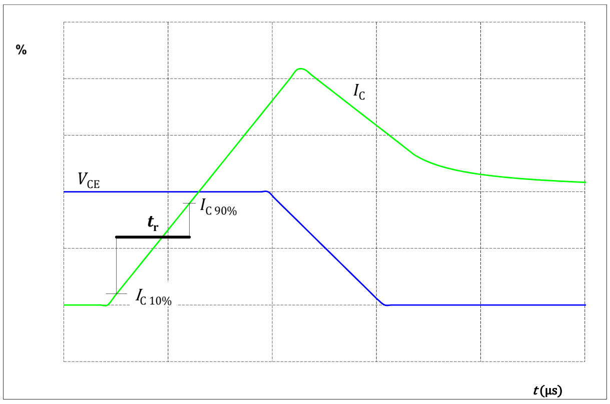


figure 51. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 52. **FWD**

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

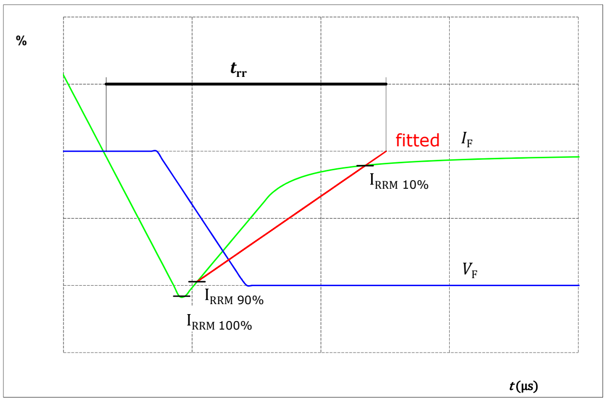
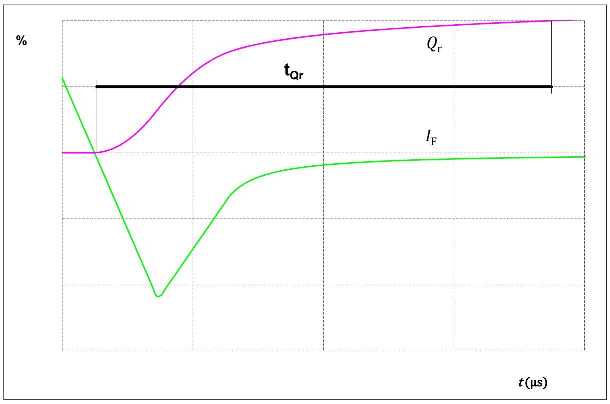


figure 53. **FWD**

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



Vincotech

Ordering Code

Version	Ordering Code
Without thermal paste	30-FT10NIA375F9-LQ08F08
With thermal paste	30-FT10NIA375F9-LQ08F08-/3/

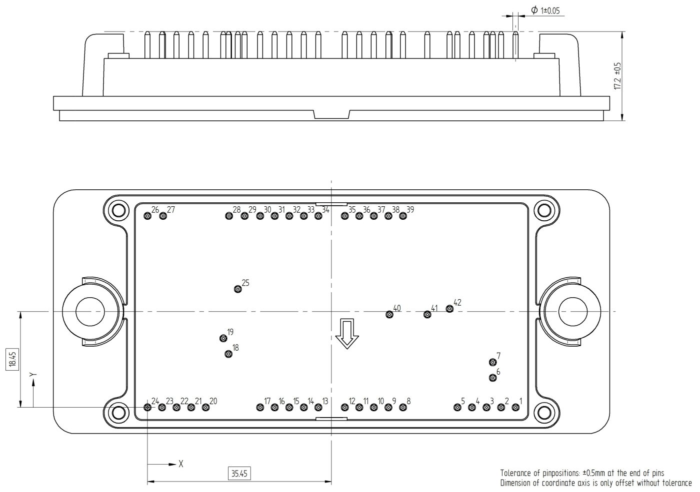
Marking

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

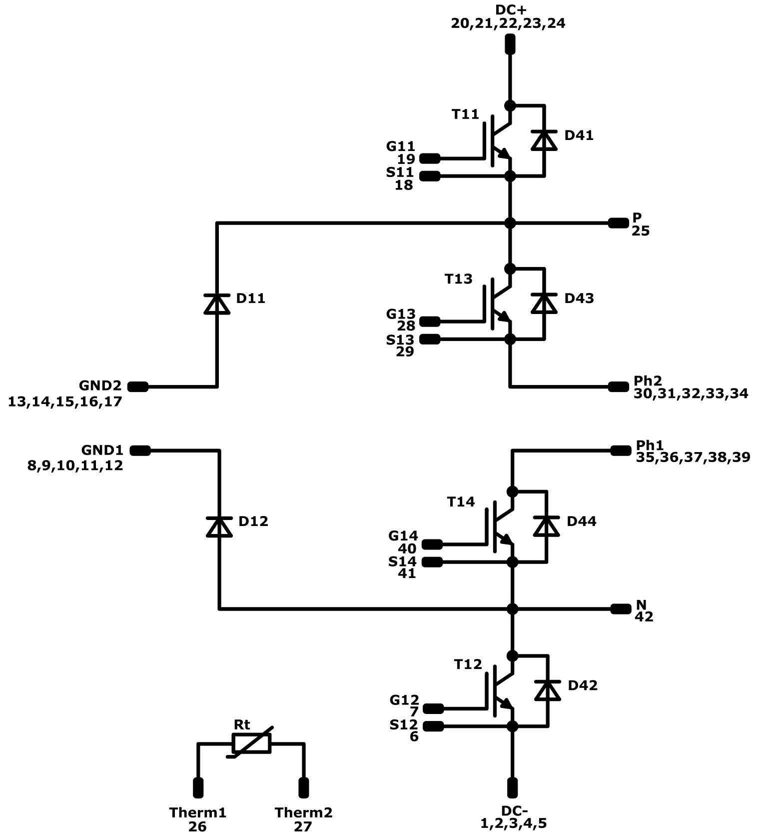
Outline

Pin	X	Y	Function
1	70,9	0	DC-
2	68,1	0	DC-
3	65,3	0	DC-
4	62,5	0	DC-
5	59,7	0	DC-
6	66,5	5,7	S12
7	66,5	8,7	G12
8	49,2	0	GND1
9	46,4	0	GND1
10	43,6	0	GND1
11	40,8	0	GND1
12	38	0	GND1
13	32,9	0	GND2
14	30,1	0	GND2
15	27,3	0	GND2
16	24,5	0	GND2
17	21,7	0	GND2
18	15,6	10,3	S11
19	14,6	13,3	G11
20	11,2	0	DC+
21	8,4	0	DC+
22	5,6	0	DC+
23	2,8	0	DC+
24	0	0	DC+
25	17,4	22,8	P
26	0	36,9	Therm1
27	3	36,9	Therm2
28	15,7	36,9	G13
29	18,7	36,9	S13
30	21,7	36,9	Ph2
31	24,5	36,9	Ph2
32	27,3	36,9	Ph2
33	30,1	36,9	Ph2
34	32,9	36,9	Ph2
35	38	36,9	Ph1
36	40,8	36,9	Ph1
37	43,6	36,9	Ph1
38	46,4	36,9	Ph1
39	49,2	36,9	Ph1
40	46,6	17,9	G14
41	53,9	17,9	S14
42	58,2	19	N

Pin table [mm]



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	950 V	375 A	NPC BUCK Switch	
D11, D12	FWD	1200 V	100 A	NPC BUCK Diode	
T13, T14	IGBT	950 V	300 A	NPC BOOST Switch	
D41, D42	FWD	950 V	150 A	NPC BOOST Diode	
D43, D44	FWD	950 V	150 A	Boost Sw. Inv. Diode	
Rt	NTC			Thermistor	

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.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-FT10NIA375F9-LQ08F08-D1-14	6 Mar. 2020		

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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.