30-FT12NIA150SH-LG09F08
30-PT12NIA150SH-LG09F08Y

Vincotech

datasheet

***flow*NPC 2** **1500 V / 150 A**

Features

- 1200 V components for 1500 V_{DC} systems
- Four quadrant operation

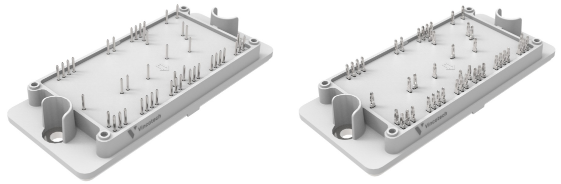
Target applications

- Solar Inverters
- Special Application

Types

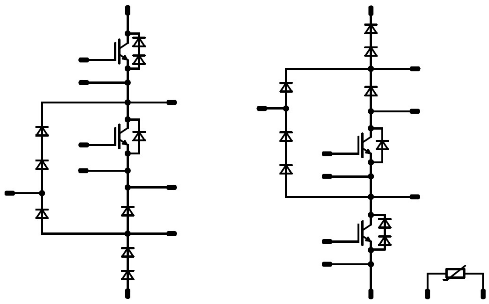
- 30-FT12NIA150SH-LG09F08
- 30-PT12NIA150SH-LG09F08Y

flow 2 13 mm housing



Solder pin   Press-fit pin

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Buck Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	137	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	345	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V V_{cc} = 800 V T_j = 150 °C	10	μs
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Buck Diode				
Peak repetitive reverse voltage	V_{RRM}		1300	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	94	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	233	W
Maximum junction temperature	T_{jmax}		175	°C
Buck Sw. Protection Diode				
Peak repetitive reverse voltage	V_{RRM}		1300	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	28	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	97	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	137	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	450	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	345	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V V_{cc} = 800 V T_j = 150 °C	10	µs
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1300	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	94	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	233	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	30	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	100	A
Surge current capability	I^2t			50	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	74	W
Maximum junction temperature	T_{jmax}			175	°C
Boost D. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	30	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	100	A
Surge current capability	I^2t			50	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	74	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Sw.Inv.Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	121	A
Surge (non-repetitive) forward current	I_{FSM}	50 Hz Single Half Sine Wave t_p = 10 ms	T_j = 150 °C	860	A
Surge current capability	I^2t			3700	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	234	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		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
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			= 525	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0052	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150	1,78	2,16 2,48 2,56	2,42	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			240	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		8800		pF
Reverse transfer capacitance	C_{res}							470		
Gate charge	Q_g		15			25		1140		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,28		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	150	25 125 150		116 120 120		ns
Rise time	t_r					25 125 150		20 23 24		
Turn-off delay time	$t_{d(off)}$					25 125 150		213 267 279		
Fall time	t_f					25 125 150		20 66 75		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,4 µC Q_{rFWD} = 8,4 µC Q_{rFWD} = 9,7 µC				25 125 150		6,23 8,57 9,33		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,36 9,58 10,74		

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]	Value Min	Value Typ	Value Max	Unit
Buck Diode										
Static										
Forward voltage	V_F				150	25 125		3,35 3,10	3,84	V
Reverse leakage current	I_R			1300		25			7,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,41		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 8628 A/µs di/dt = 8113 A/µs di/dt = 8006 A/µs	±15	600	150	25 125 150		110 139 151		A
Reverse recovery time	t_{rr}					25 125 150		79 111 124		ns
Recovered charge	Q_r					25 125 150		4,42 8,38 9,74		µC
Reverse recovered energy	E_{rec}					25 125 150		1,50 3,08 3,62		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		7069 1003 1214		A/µs
Buck Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 125		3,56 3,62	4,44	V
Reverse leakage current	I_R			1300		25			1,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,97		K/W

Characteristic Values

Parameter	Symbol	Conditions					Value			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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0052	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150	1,78	2,16 2,48 2,56	2,42	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			240	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	25		25		8800		pF
Reverse transfer capacitance	C_{res}	f= 1 Mhz	0	25		25		470		pF
Gate charge	Q_g		15			25		1140		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,28		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	150	25 125 150		111 118 118		ns
Rise time	t_r	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	150	25 125 150		21 23 23		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	150	25 125 150		209 266 285		ns
Fall time	t_f	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	600	150	25 125 150		25 65 84		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,2 µC Q_{rFWD} = 8,7 µC Q_{rFWD} = 10,3 µC	±15	600	150	25 125 150		5,76 8,31 9,10		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	150	25 125 150		5,12 8,86 10,49		mWs

Characteristic Values

Parameter	Symbol	Conditions					Value			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				150	25 125		3,35 3,10	3,84	V
Reverse leakage current	I_R			1300		25			7,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,41		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 7944 A/µs di/dt = 7602 A/µs di/dt = 7467 A/µs	±15	600	150	25 125 150		87 127 139		A
Reverse recovery time	t_{rr}					25 125 150		88 126 149		ns
Recovered charge	Q_r					25 125 150		4,20 8,68 10,27		µC
Reverse recovered energy	E_{rec}					25 125 150		1,48 2,90 3,55		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2530 874 1472		A/µs
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				25	25 125 150		2,27 2,44 2,36	2,74	V
Reverse leakage current	I_R			1200		25 150			60 3300	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,29		K/W

Characteristic Values

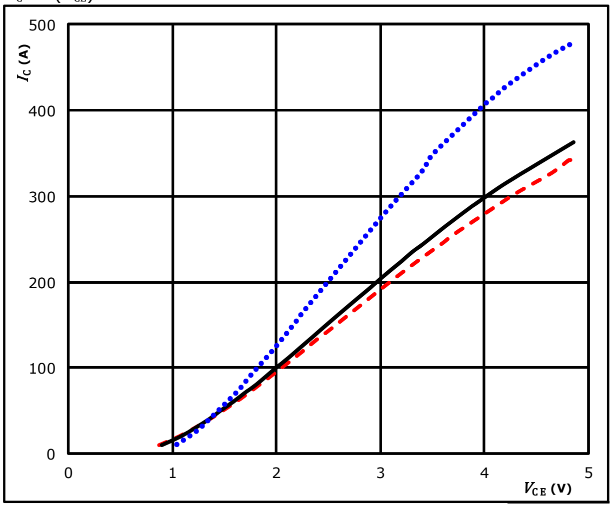
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost D. Protection Diode										
Static										
Forward voltage	V_F				25	25 125 150		2,27 2,44 2,36	2,74	V
Reverse leakage current	I_R			1200		25 150			60 3300	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,29		K/W
Boost Sw.Inv.Diode										
Static										
Forward voltage	V_F				150	25 125 150		2,22 2,30 2,23	2,49	V
Reverse leakage current	I_R			1200		25 150			240 28000	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,41		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

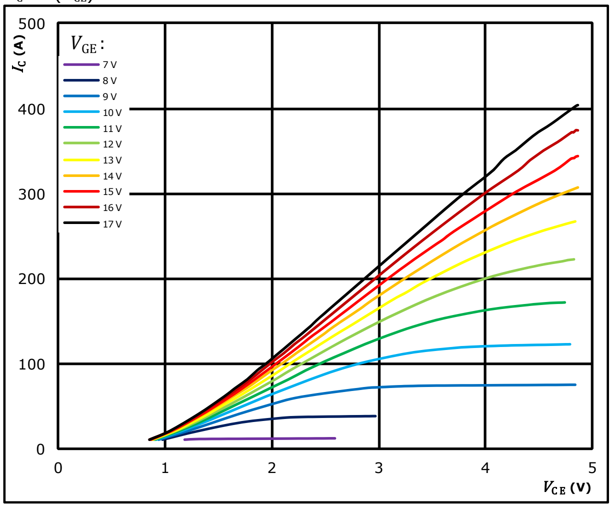


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C / 125 °C / 150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

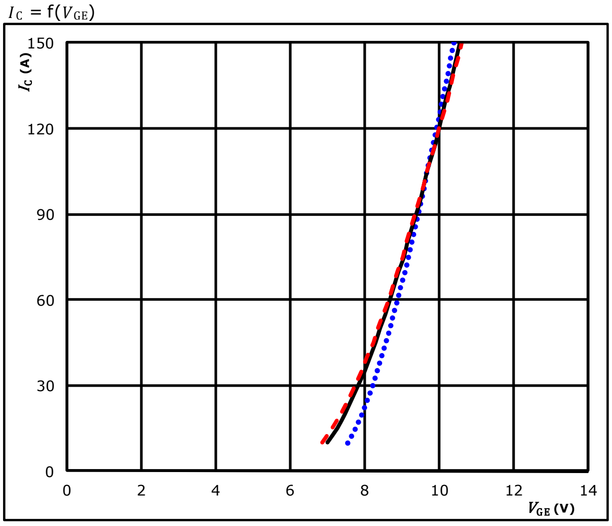


t_p = 250 µs
T_j = 125 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

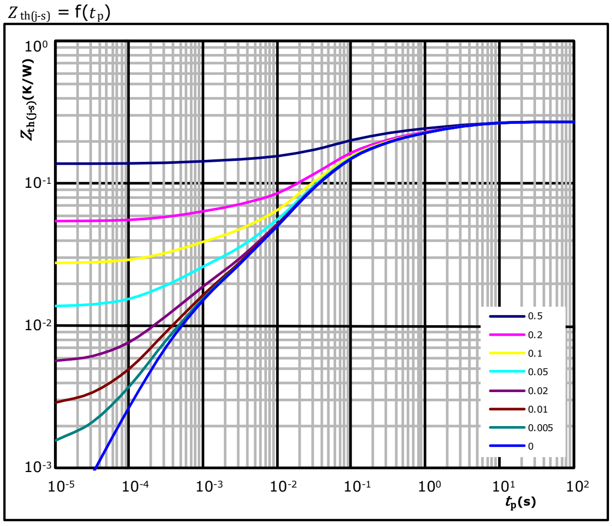


t_p = 100 µs
V_{CE} = 10 V
T_j: 25 °C / 125 °C / 150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T
$R_{th(j-s)}$ = 0,28 K/W

IGBT thermal model values

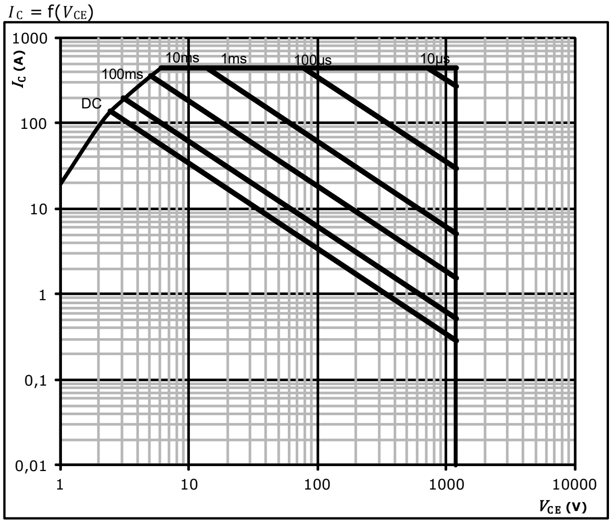
R (K/W)	τ (s)
2,55E-02	5,27E+00
4,70E-02	1,31E+00
6,23E-02	2,29E-01
9,01E-02	5,22E-02
3,16E-02	1,71E-02
9,83E-03	2,13E-03
8,64E-03	4,08E-04

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



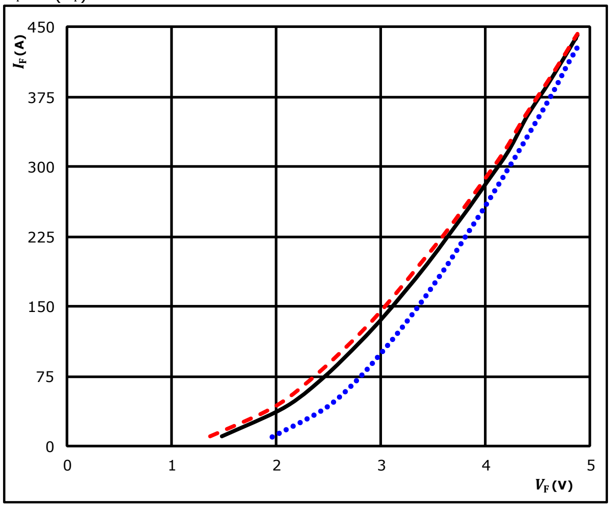
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$



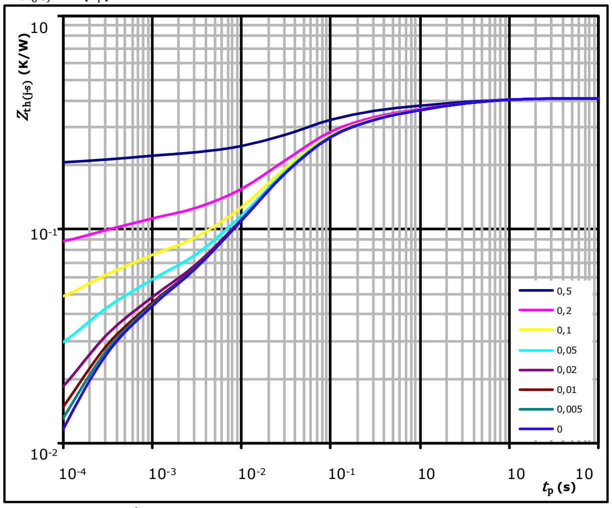
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,41 K/W

FWD thermal model values

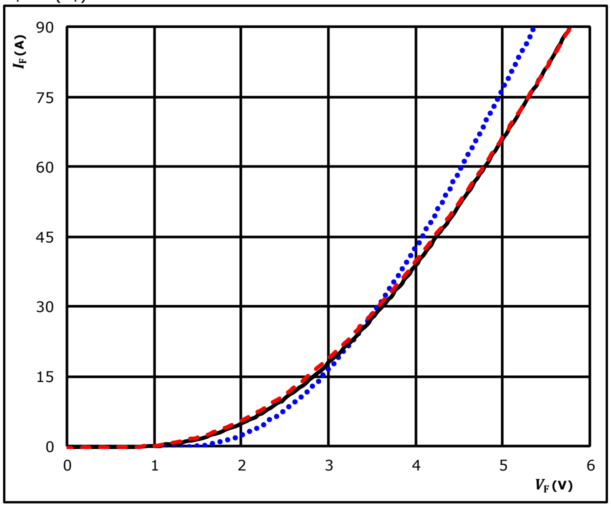
R (K/W)	τ (s)
3,46E-02	5,29E+00
5,25E-02	9,84E-01
8,36E-02	1,62E-01
1,54E-01	3,91E-02
4,14E-02	9,22E-03
1,35E-02	1,28E-03
2,79E-02	2,39E-04

Buck Sw. Protection Diode Characteristics

figure 1. **Prot. Diode**

Typical forward characteristics

$I_F = f(V_F)$



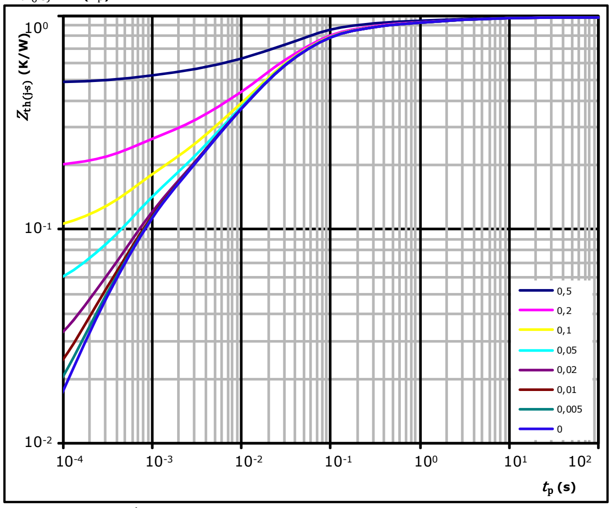
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **Prot. Diode**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,97 K/W

Prot. Diode thermal model values

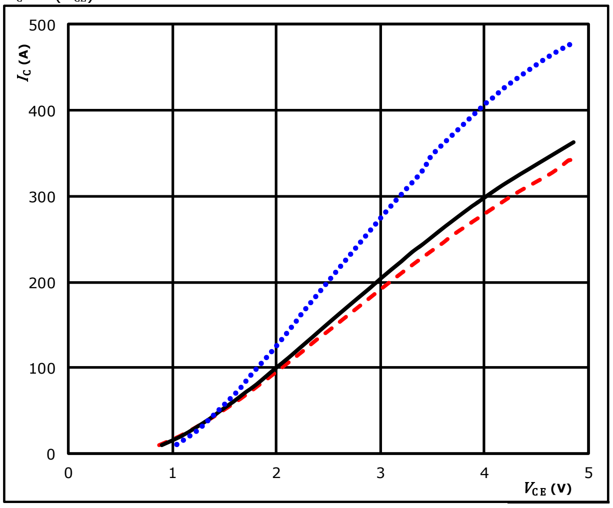
R (K/W)	τ (s)
3,38E-02	6,50E+00
7,05E-02	9,48E-01
1,87E-01	1,18E-01
4,58E-01	2,73E-02
1,41E-01	4,93E-03
8,48E-02	6,22E-04

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

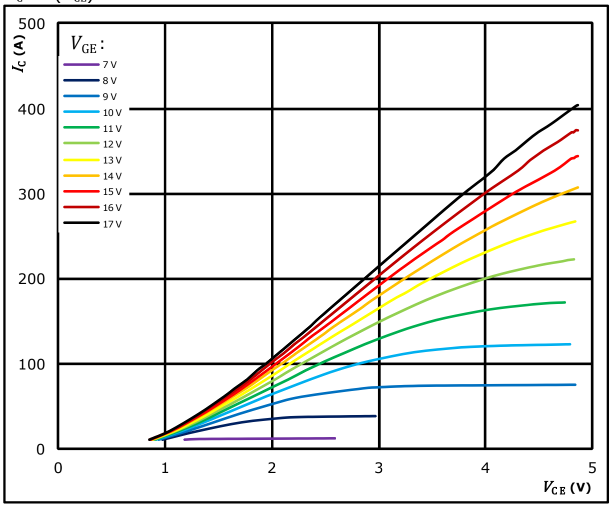


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

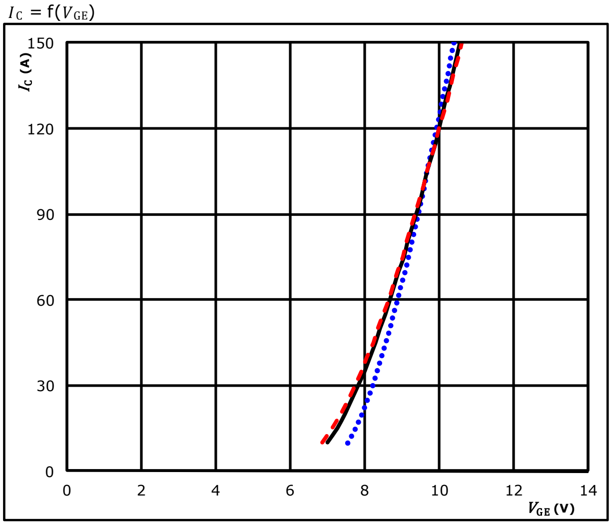
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

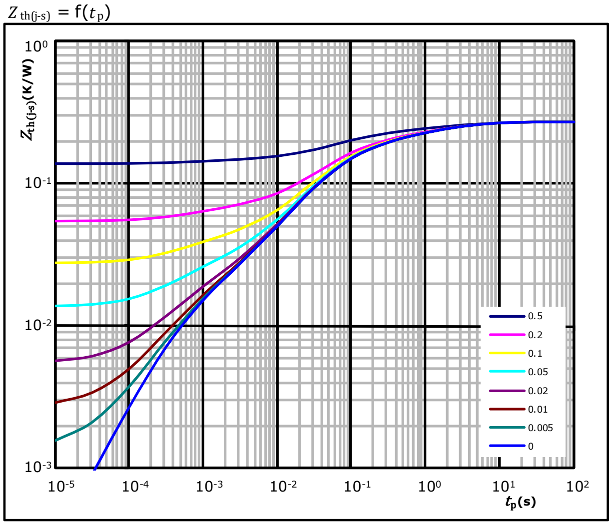


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,28 K/W

IGBT thermal model values

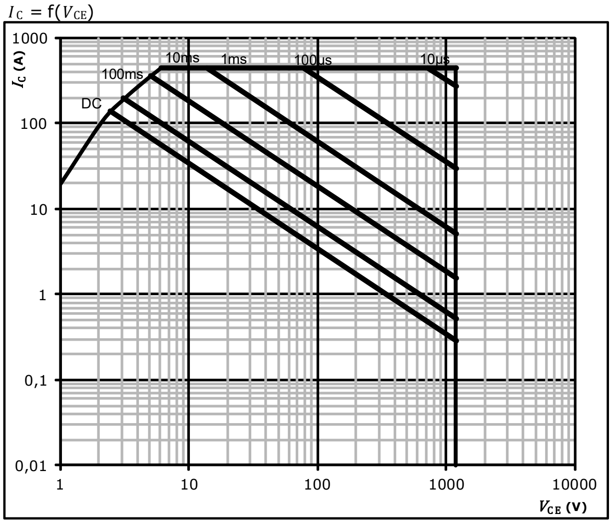
R (K/W)	τ (s)
2,55E-02	5,27E+00
4,70E-02	1,31E+00
6,23E-02	2,29E-01
9,01E-02	5,22E-02
3,16E-02	1,71E-02
9,83E-03	2,13E-03
8,64E-03	4,08E-04

Boost Switch Characteristics

figure 5. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



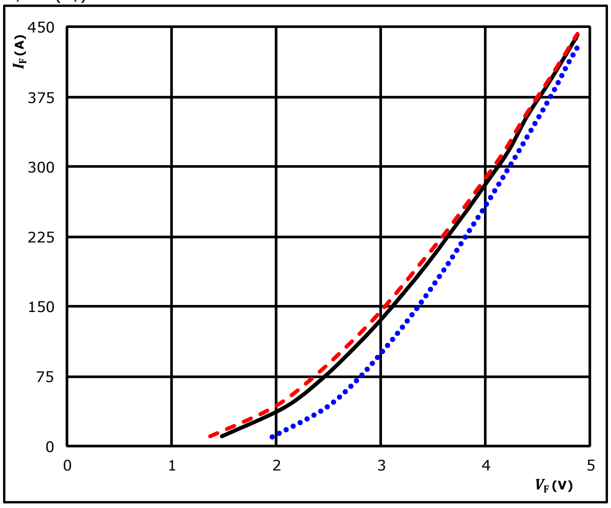
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



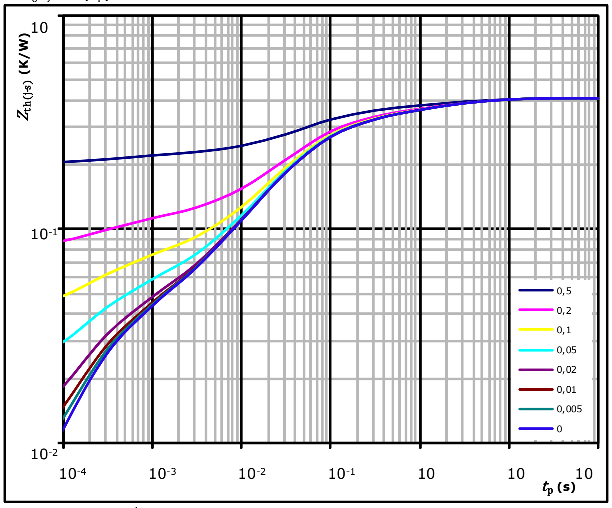
t_p = 250 µs

T_j: 25 °C / 125 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,41 K/W

FWD thermal model values

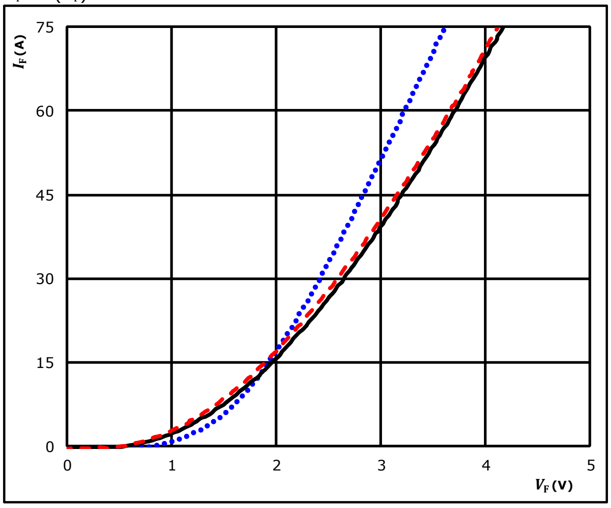
R (K/W)	τ (s)
3,46E-02	5,29E+00
5,25E-02	9,84E-01
8,36E-02	1,62E-01
1,54E-01	3,91E-02
4,14E-02	9,22E-03
1,35E-02	1,28E-03
2,79E-02	2,39E-04

Boost Sw. Protection Diode Characteristics

figure 1. **Prot. Diode**

Typical forward characteristics

$I_F = f(V_F)$



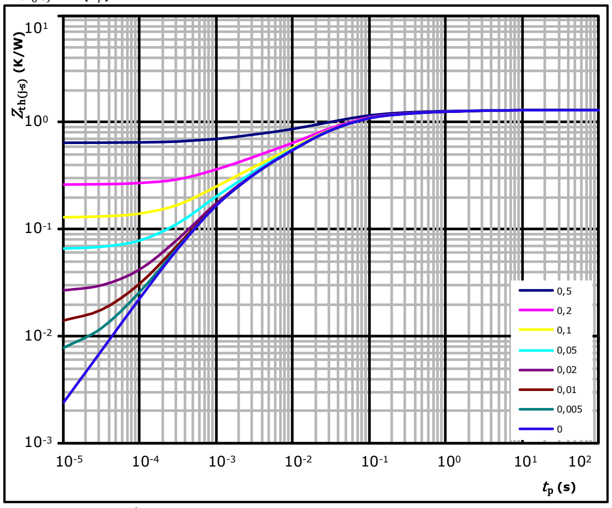
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **Prot. Diode**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,29 K/W

Prot. Diode thermal model values

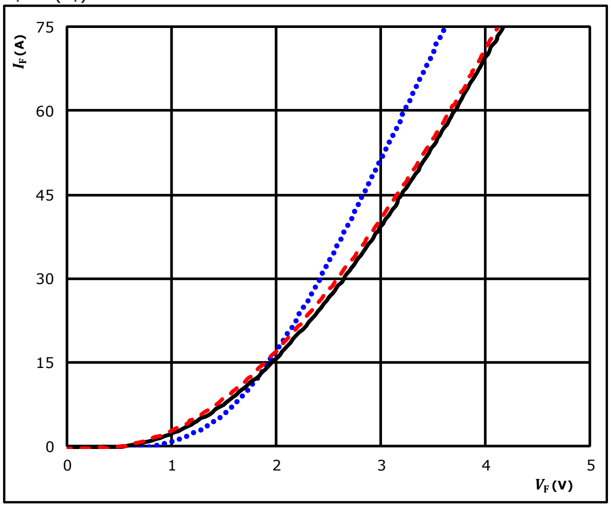
R (K/W)	τ (s)
6,16E-02	2,03E+00
1,25E-01	2,79E-01
4,82E-01	4,69E-02
3,44E-01	1,34E-02
1,35E-01	3,30E-03
1,42E-01	8,91E-04

Boost D. Protection Diode Characteristics

figure 1. **Prot. Diode**

Typical forward characteristics

$I_F = f(V_F)$



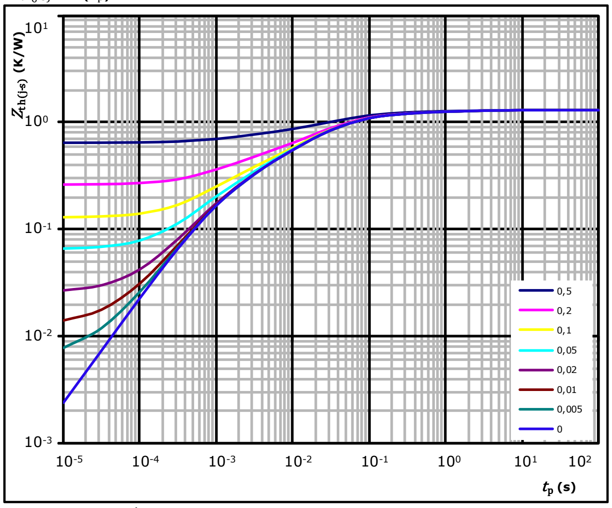
t_p = 250 µs

T_j: 25 °C / 125 °C / 150 °C

figure 2. **Prot. Diode**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 1,29 K/W

Prot. Diode thermal model values

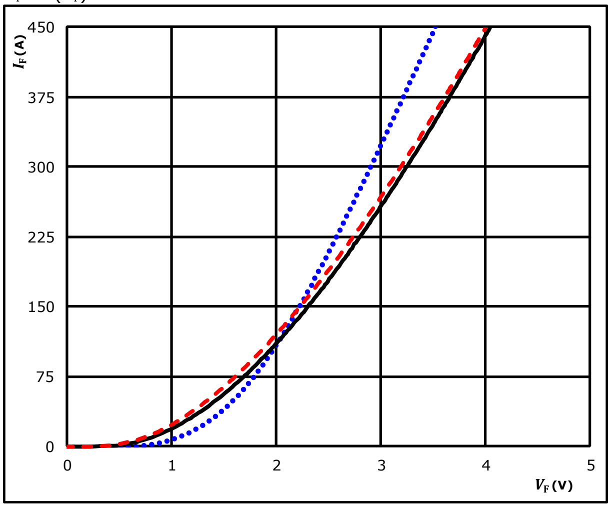
R (K/W)	τ (s)
6,16E-02	2,03E+00
1,25E-01	2,79E-01
4,82E-01	4,69E-02
3,44E-01	1,34E-02
1,35E-01	3,30E-03
1,42E-01	8,91E-04

Boost Sw.Inv.Diode Characteristics

figure 1. FWD

Typical forward characteristics

$I_F = f(V_F)$



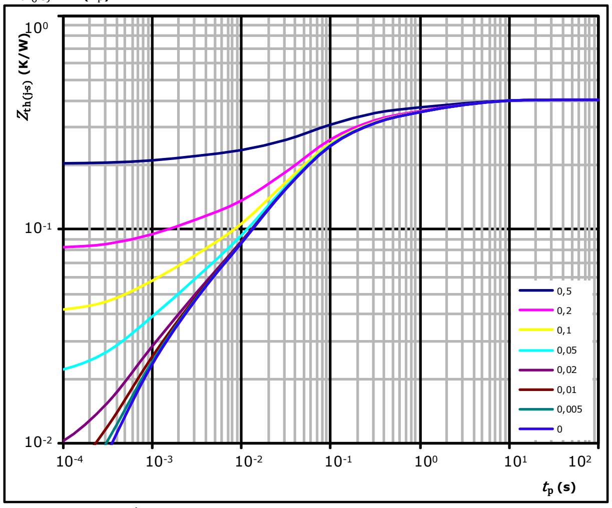
t_p = 250 μs

T_j: 25 °C; 125 °C; 150 °C

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,41 K/W

FWD thermal model values

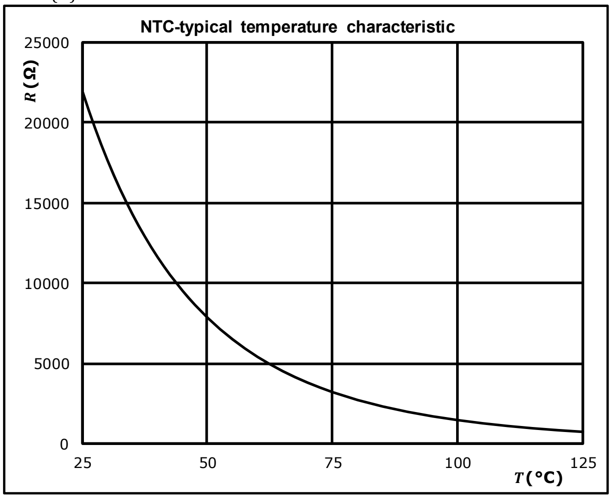
R (K/W)	τ (s)
4,46E-02	3,97E+00
5,69E-02	7,74E-01
1,16E-01	1,33E-01
1,34E-01	3,91E-02
2,84E-02	7,16E-03
2,55E-02	1,10E-03

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

$R = f(T)$

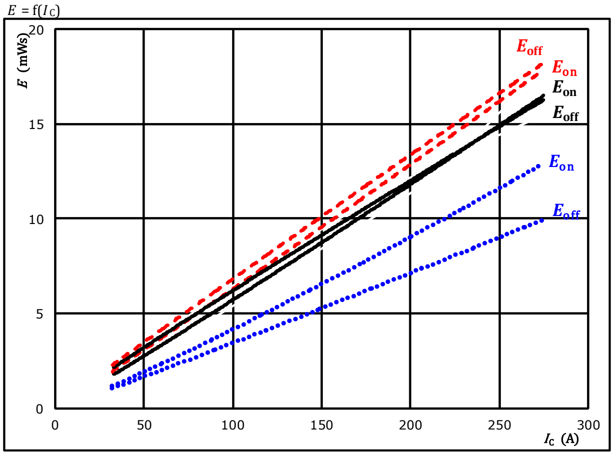


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



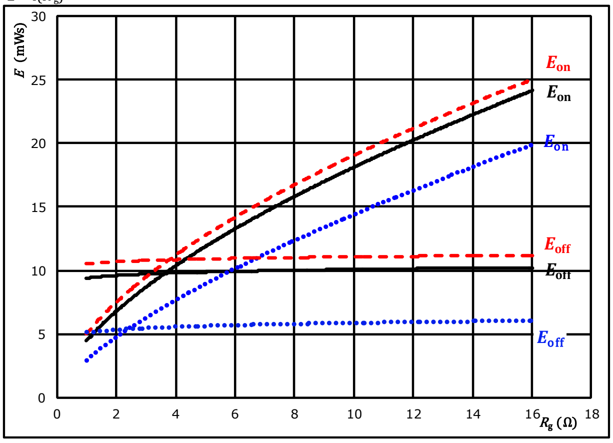
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



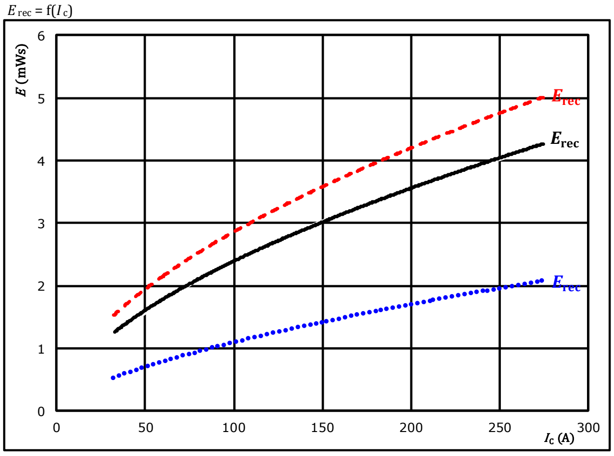
With an inductive load at

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

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



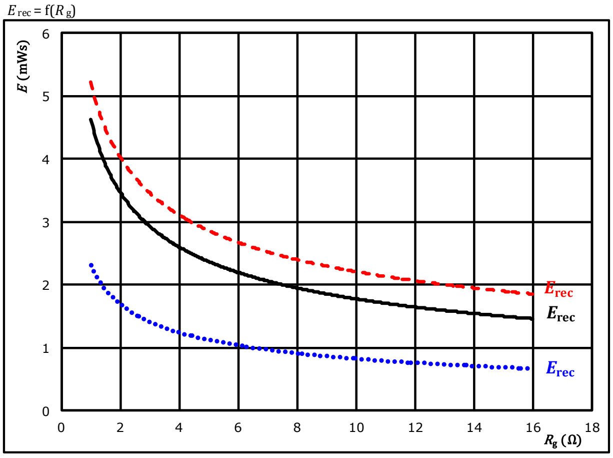
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

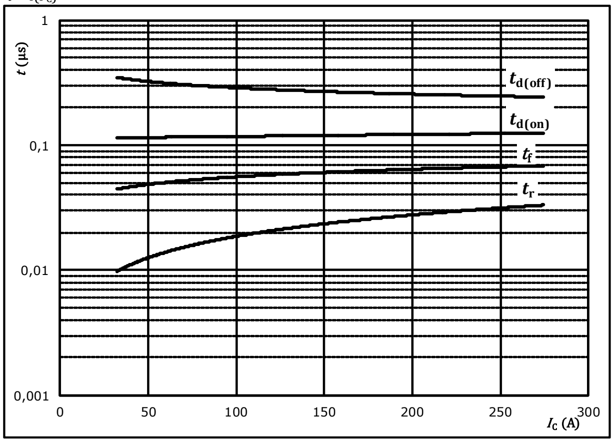
V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	150	A		150 °C	dashed

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



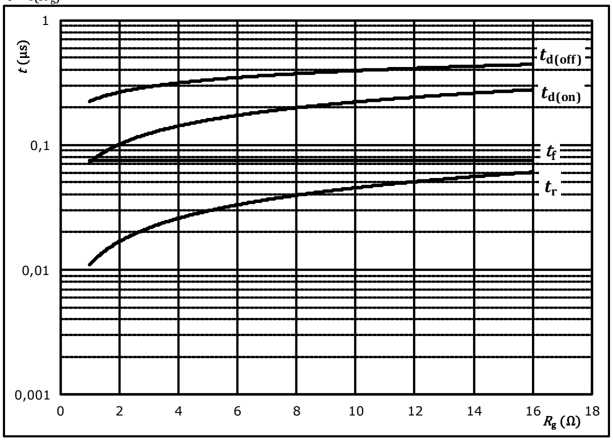
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



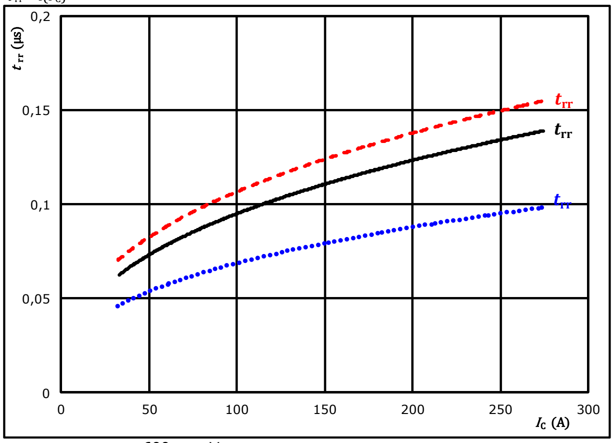
With an inductive load at

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

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

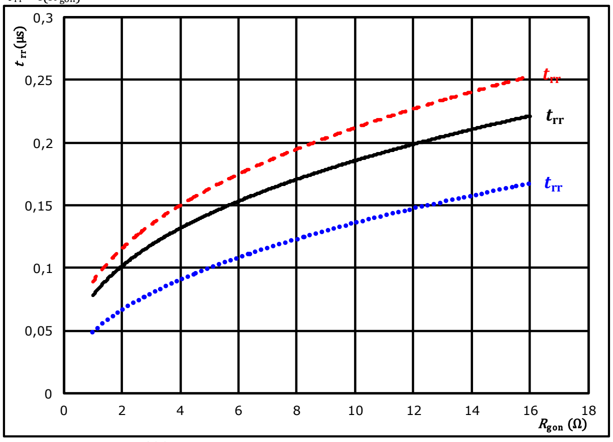


At					
V_{CE}=	600	V		25 °C	dotted
V_{GE} =	±15	V	T_j:	125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

figure 8. **FWD**

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

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



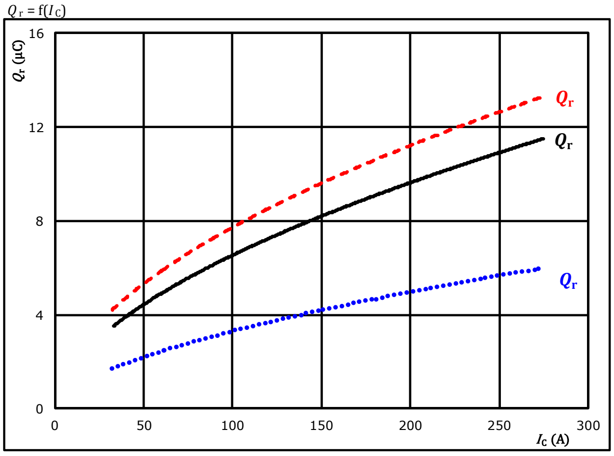
At					
V_{CE}=	600	V		25 °C	dotted
V_{GE} =	±15	V	T_j:	125 °C	solid
I_C =	150	A		150 °C	dashed

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

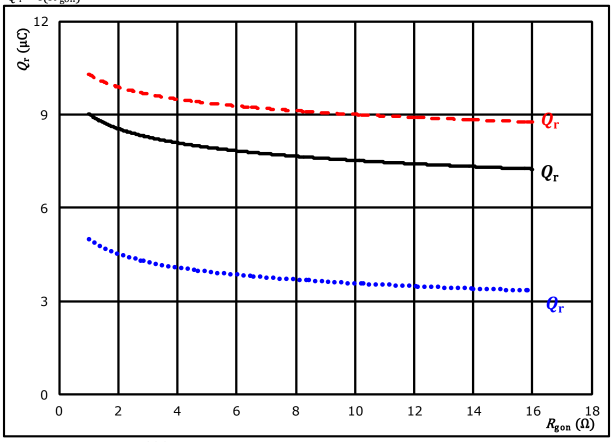


At					
V_{CE} =	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

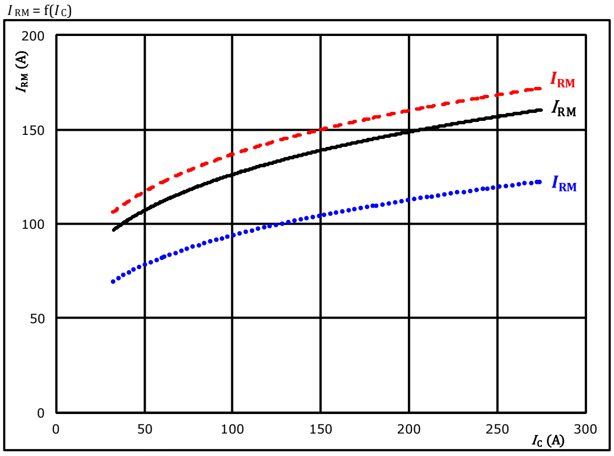


At					
V_{CE}=	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	150	A		150 °C	– – –

figure 11. **FWD**

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

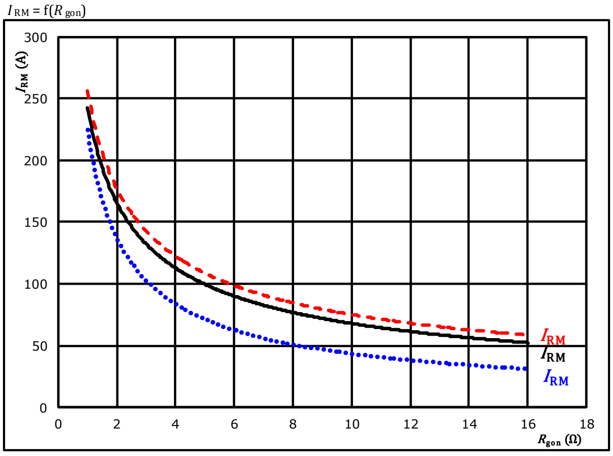


At					
V_{CE}:	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

figure 12. **FWD**

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

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



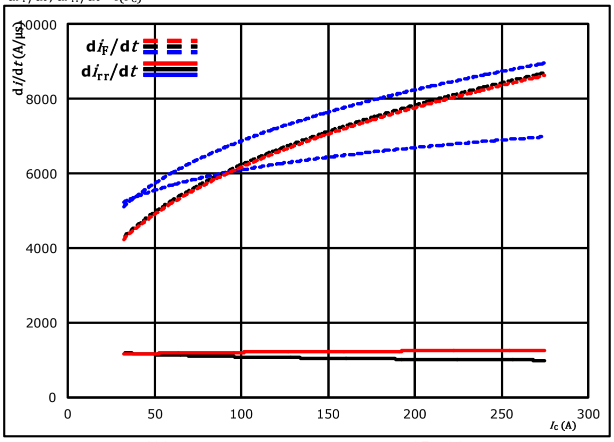
At					
V_{CE} =	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	150	A		150 °C	– – –

Buck Switching Characteristics

figure 13. **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)

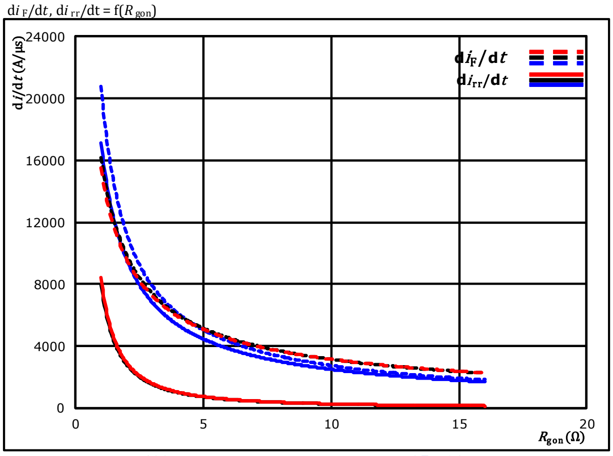


At					
V_{CE} =	600	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

figure 14. **FWD**

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

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

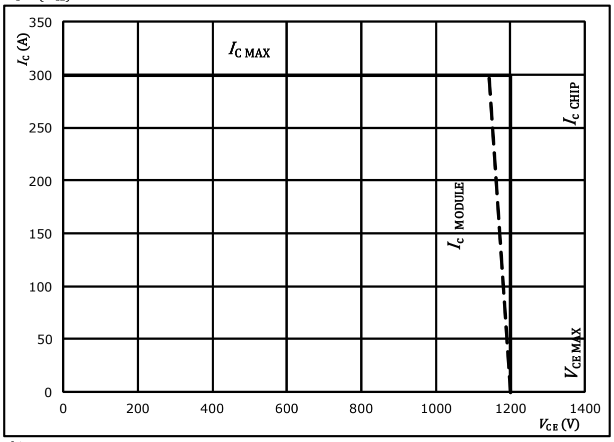


At					
V_{CE} =	600	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	150	A		150	°C

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At		
T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

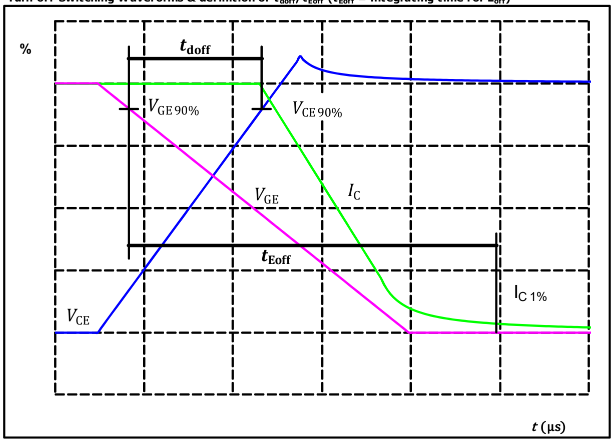
Buck Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

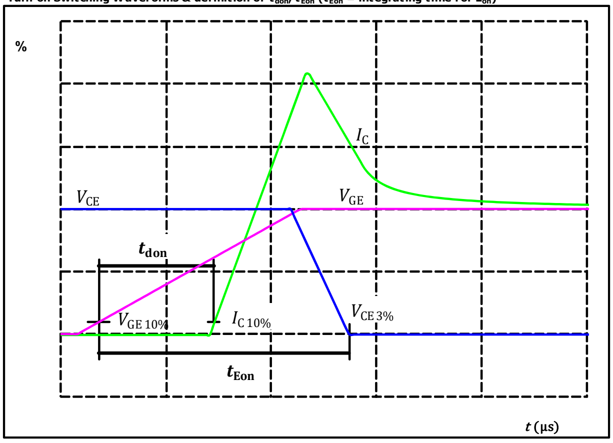
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_{doff} =	267	ns

figure 2. IGBT

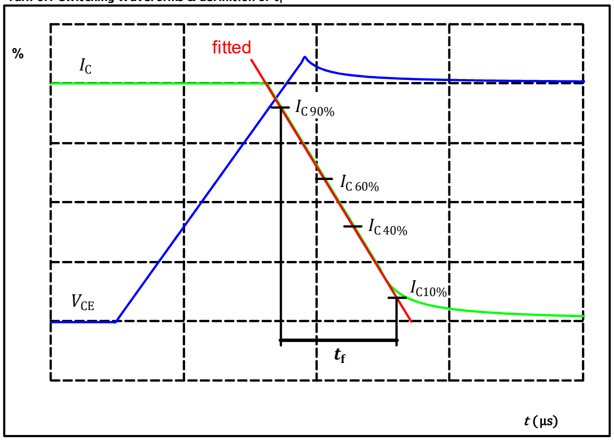
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_{don} =	120	ns

figure 3. IGBT

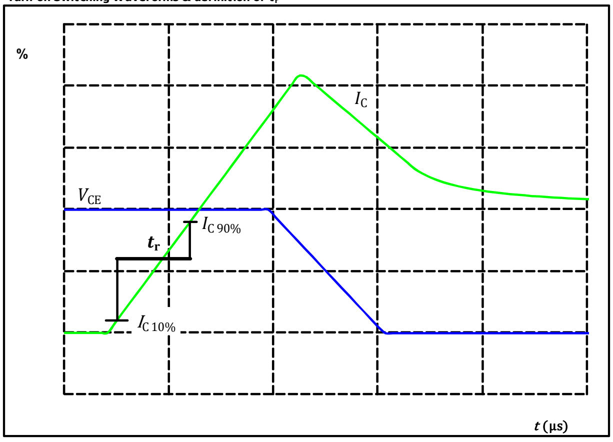
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_f =	66	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

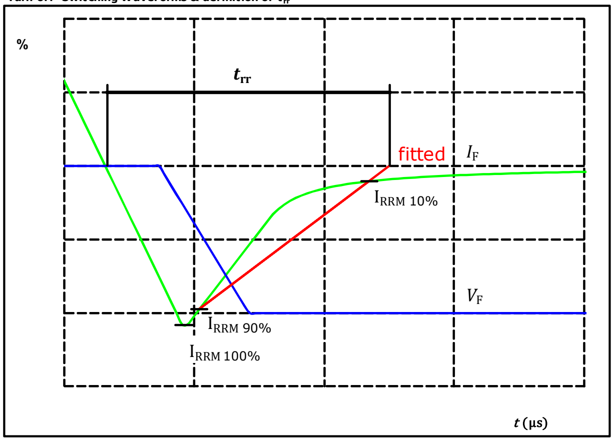


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_r =	23	ns

Buck Switching Characteristics

figure 5. **FWD**

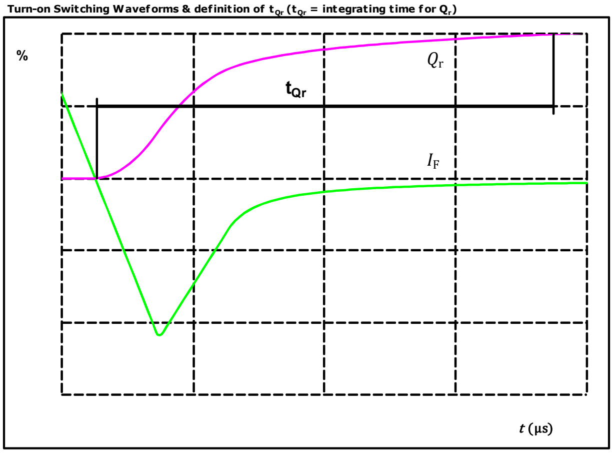
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	600	V
I_F (100%) =	150	A
I_{RRM} (100%) =	139	A
t_{rr} =	111	ns

figure 6. **FWD**

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



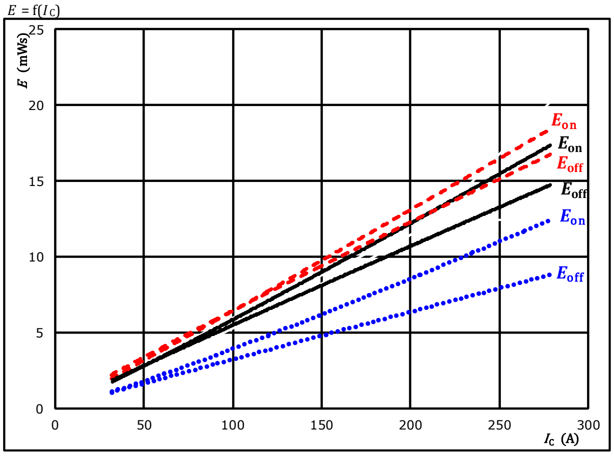
I_F (100%) =	150	A
Q_r (100%) =	8,38	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

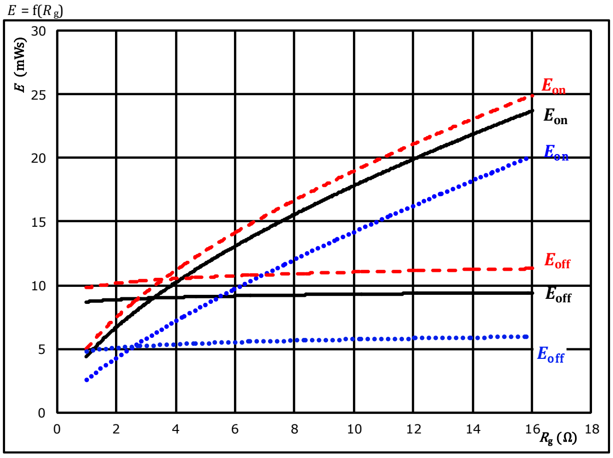
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω
R_{goff} = 4 Ω

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



With an inductive load at

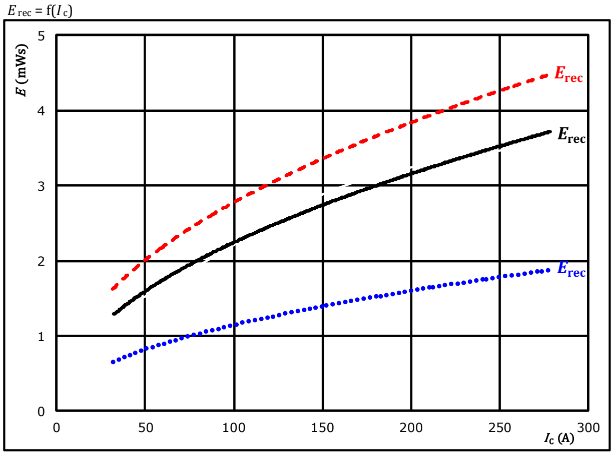
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 150 A

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

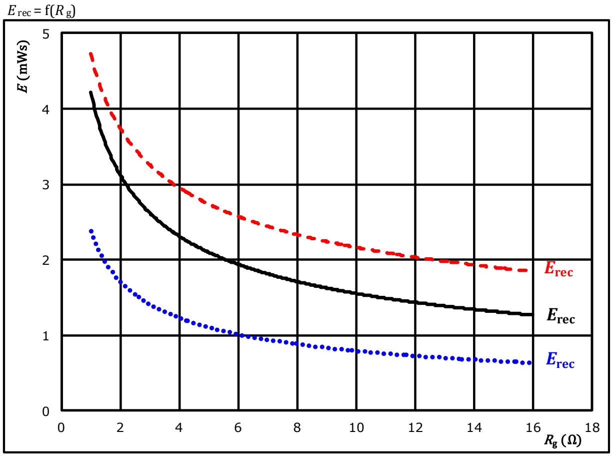
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 4 Ω

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 4. **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
V_{GE} = ±15 V
I_C = 150 A

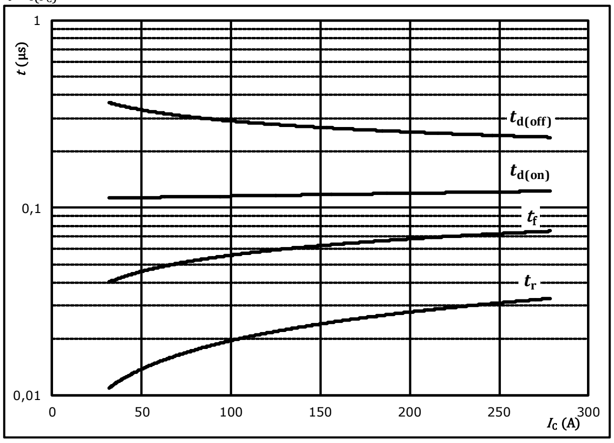
T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



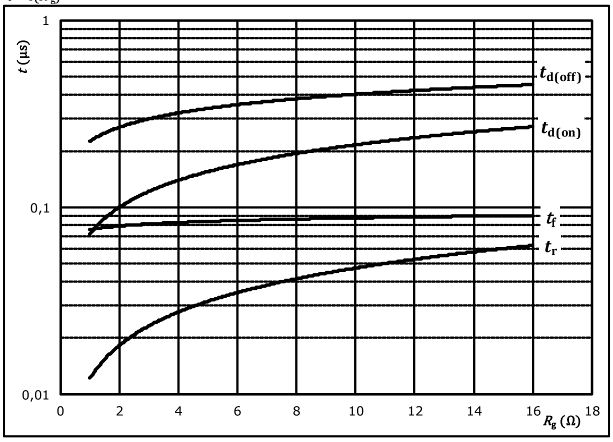
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



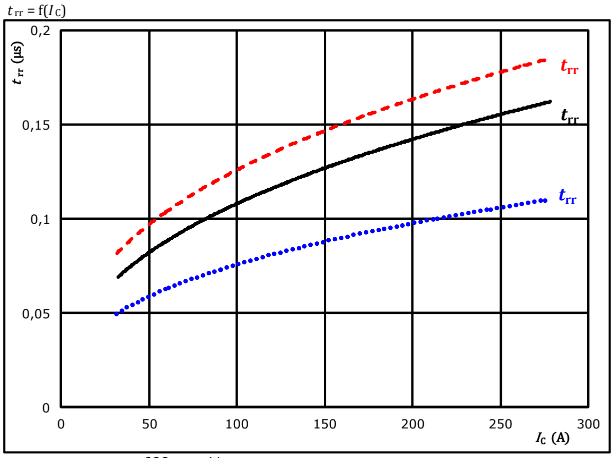
With an inductive load at

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

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

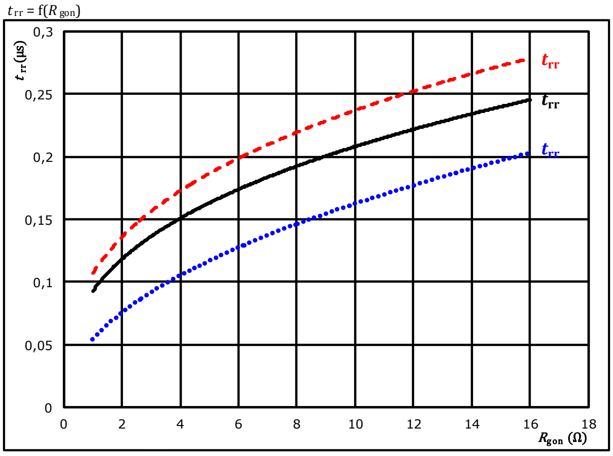


At V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 8. FWD

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

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



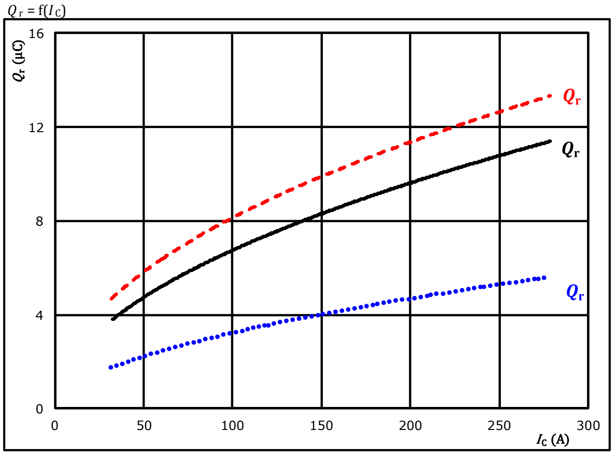
At V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	150	A		150 °C

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

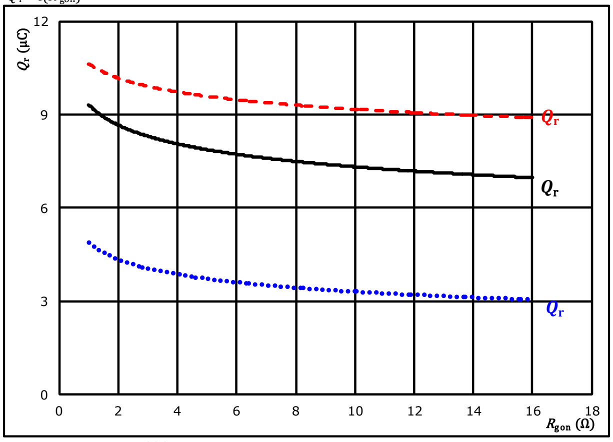


At					
V_{CE} =	600	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	- - -

figure 10. FWD

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

$Q_r = f(R_{gon})$

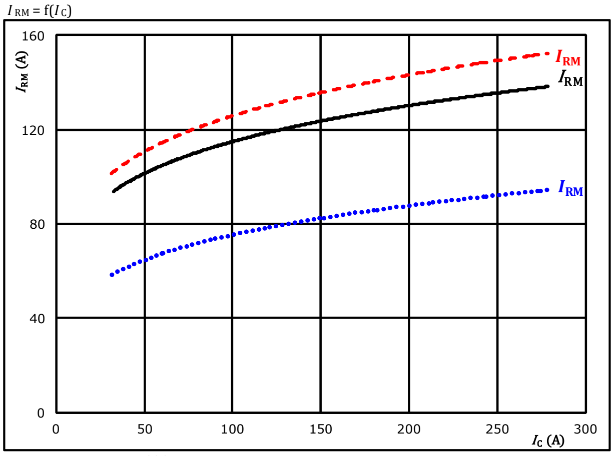


At					
V_{CE}=	600	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	150	A		150 °C	- - -

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

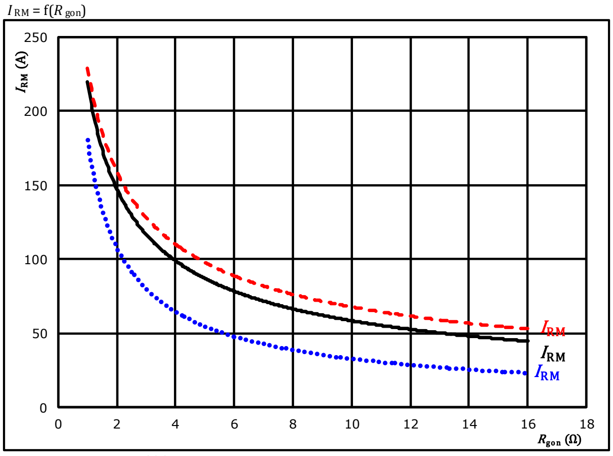


At					
V_{CE}:	600	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	- - -

figure 12. FWD

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

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



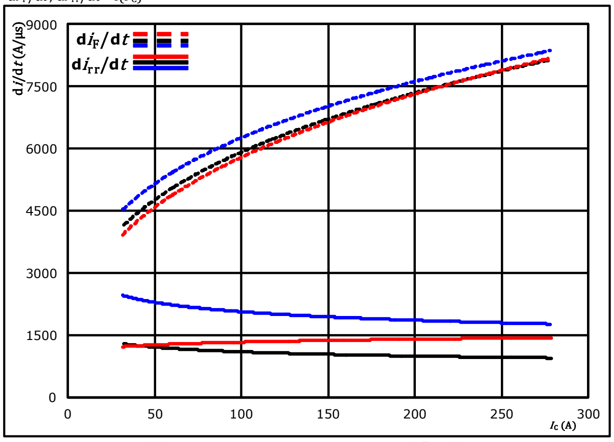
At					
V_{CE} =	600	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	150	A		150 °C	- - -

Boost Switching Characteristics

figure 13. **FWD**

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

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

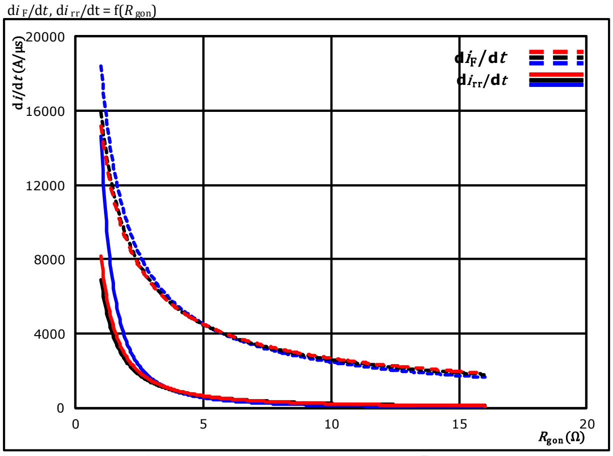


At					
V_{CE} =	600	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
R_{gon} =	4	Ω		150	°C

figure 14. **FWD**

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

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

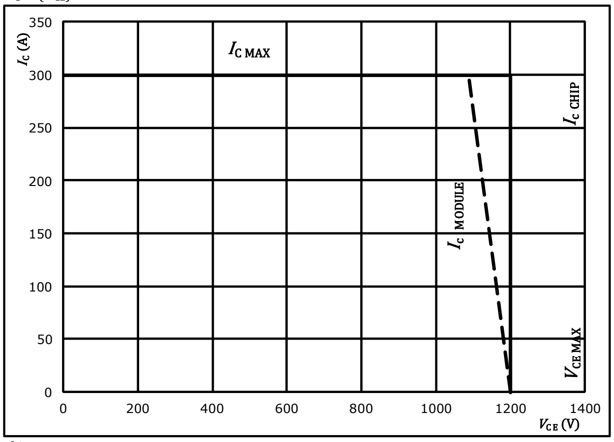


At					
V_{CE} =	600	V		25	°C
V_{GE} =	±15	V	T_j:	125	°C
I_C =	150	A		150	°C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

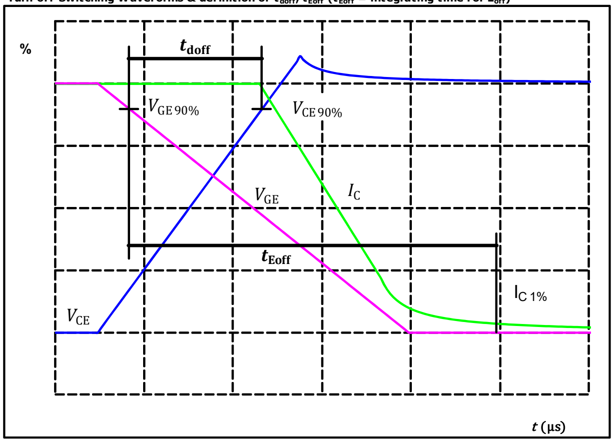
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

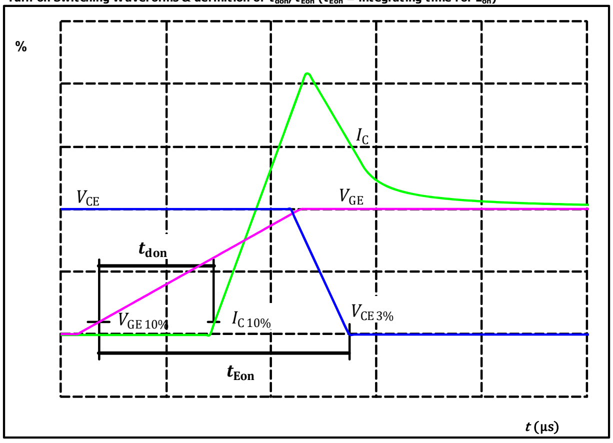
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_{doff} =	266	ns

figure 2. IGBT

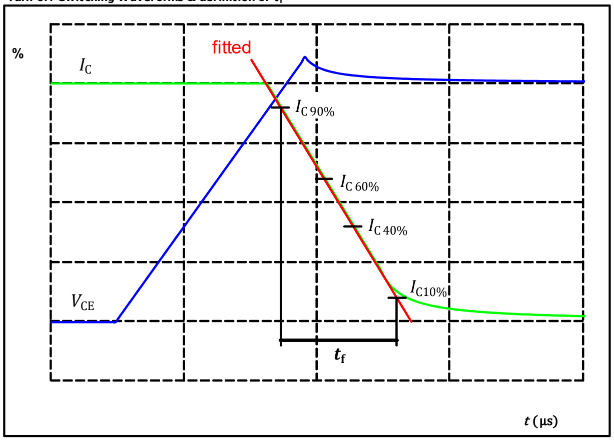
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_{don} =	118	ns

figure 3. IGBT

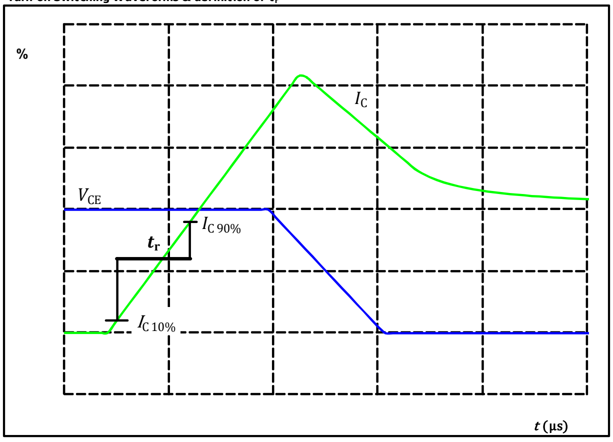
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_f =	65	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

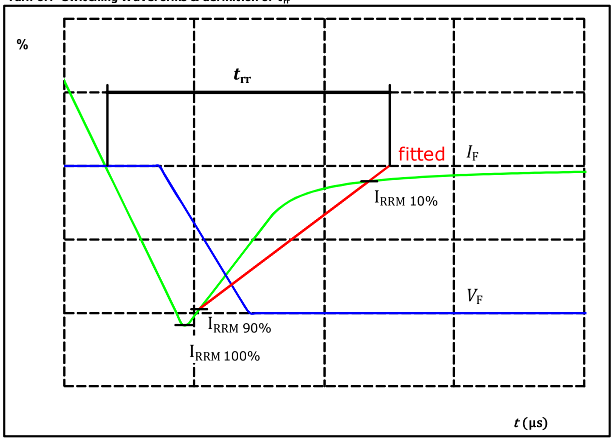


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	150	A
t_r =	23	ns

Boost Switching Characteristics

figure 5. FWD

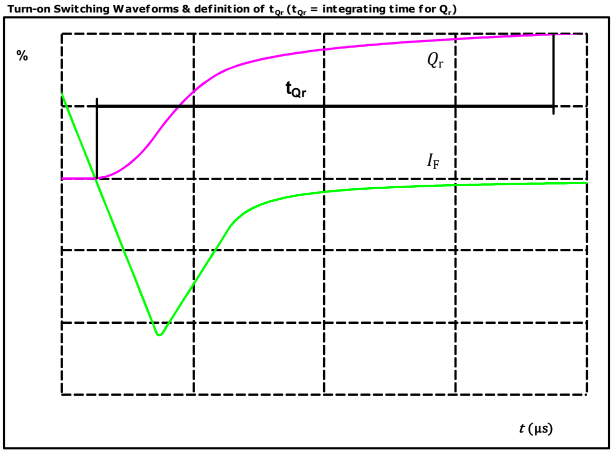
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	600	V
I_F (100%) =	150	A
I_{RRM} (100%) =	127	A
t_{rr} =	126	ns

figure 6. FWD

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



I_F (100%) =	150	A
Q_r (100%) =	8,68	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste 13 mm housing with solder pins	30-FT12NIA150SH-LG09F08
without thermal paste 13 mm housing with Press-fit pins	30-PT12NIA150SH-LG09F08Y
with thermal paste 13 mm housing with solder pins	30-FT12NIA150SH-LG09F08-/3/
with thermal paste 13 mm housing with Press-fit pins	30-PT12NIA150SH-LG09F08Y-/3/

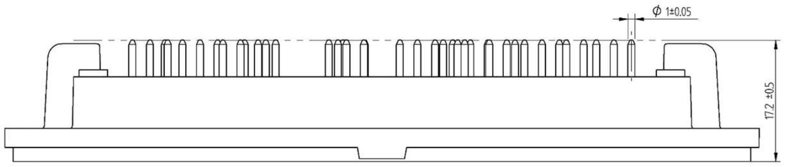
	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	Lot number	Serial	Date code		
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

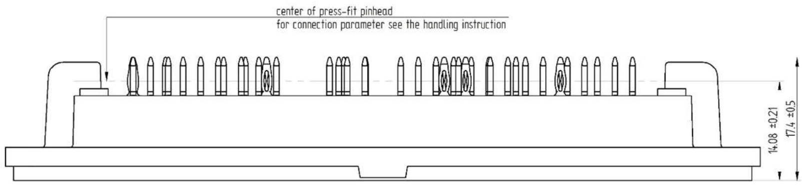
Pin table

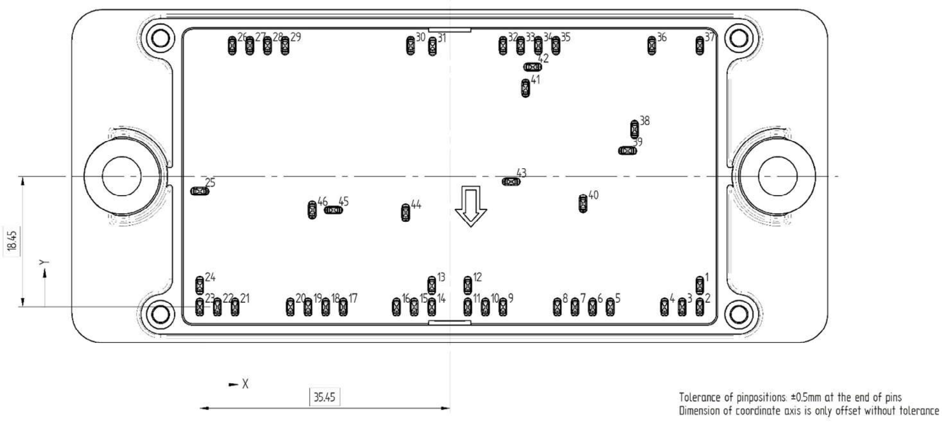
Pin	X	Y	Function
1	70,9	3	DC+1
2	70,9	0	DC+1
3	68,4	0	DC+1
4	65,9	0	DC+1
5	58,2	0	GND1
6	55,7	0	GND1
7	53,2	0	GND1
8	50,7	0	GND1
9	43	0	DC-1
10	40,5	0	DC-1
11	38	0	DC-1
12	38	3	DC-1
13	32,9	3	DC-2
14	32,9	0	DC-2
15	30,4	0	DC-2
16	27,9	0	DC-2
17	20,35	0	GND2
18	17,85	0	GND2
19	15,35	0	GND2
20	12,85	0	GND2
21	5	0	DC+2
22	2,5	0	DC+2
23	0	0	DC+2
24	0	3	DC+2
25	0	16,35	TM14
26	4,6	36,9	Ph2
27	7,1	36,9	Ph2
28	9,6	36,9	Ph2
29	12,1	36,9	Ph2
30	29,9	36,9	G12
31	33	36,8	S12
32	43	36,9	Ph1
33	45,5	36,9	Ph1
34	48	36,9	Ph1
35	50,5	36,9	Ph1
36	64,1	36,9	Therm1
37	70,9	36,9	Therm2
38	61,65	25,05	G11
39	60,65	22,05	S11
40	54,35	14,6	TM11
41	46,2	30,9	S13
42	47,2	33,9	G13
43	44,15	17,7	TM15
44	29,2	13,3	TM12
45	18,95	13,7	S14
46	15,95	13,7	G14

Solder pin

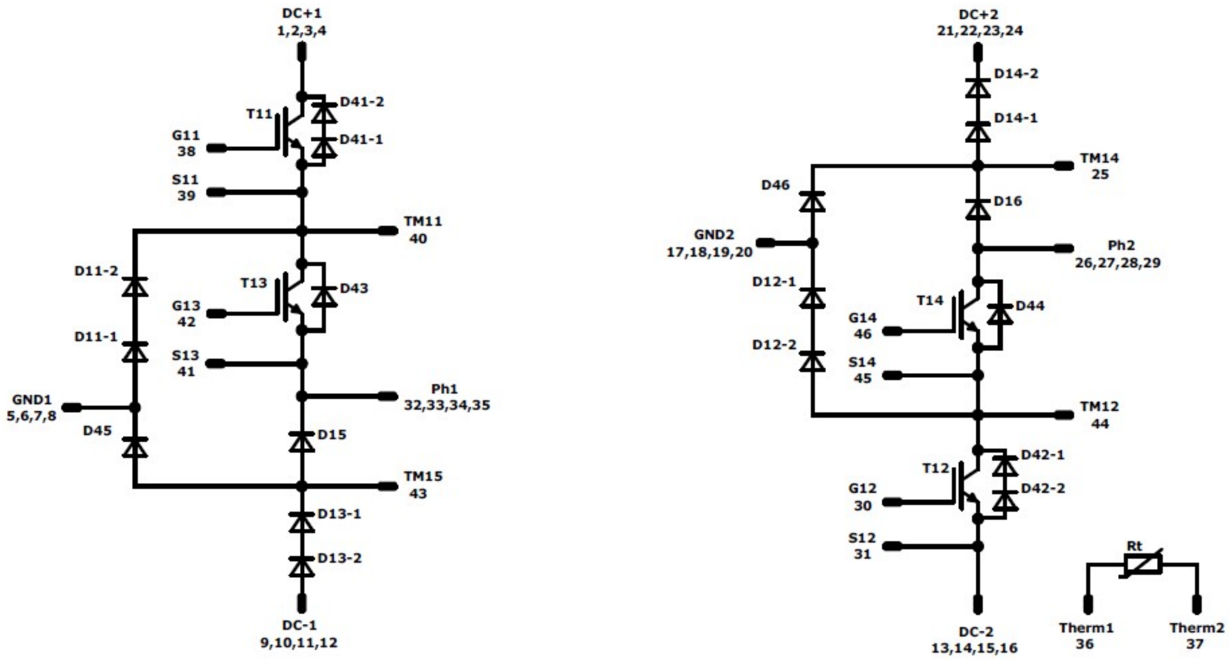


Press-fit pin





Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	150 A	Buck Switch	
D11, D12	FWD	1300 V	150 A	Buck Diode	
D41, D42	FWD	1300 V	30 A	Buck Sw. Protection Diode	
T14, T13	IGBT	1200 V	150 A	Boost Switch	
D13, D14	FWD	1300 V	150 A	Boost Diode	
D43, D44	FWD	1200 V	25 A	Boost Sw. Protection Diode	
D45, D46	FWD	1200 V	25 A	Boost D. Protection Diode	
D15, D16	FWD	1200 V	150 A	Boost Sw.Inv.Diode	
Rt	NTC			Thermistor	

30-FT12NIA150SH-LG09F08
30-PT12NIA150SH-LG09F08Y

datasheet

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-xT12NIA150SH-LG09F08x-D3-14	09 Jul. 2019	Marketing application voltage modified	1