Vincotech

10-FY07NPA150SM02-L365F08 / 10-PY07NPA150SM02-L365F08Y
datasheet

***flow*NPC 1** **1200 V / 150 A**

Features

- NPC inverter topology
- Optimized for full rated bi-directional usage (4 quadrant
- High-speed IGBT in all switch positions
- Integrated NTC
- Low inductive design with integrated DC capacitor
- *flow* 1 12mm package

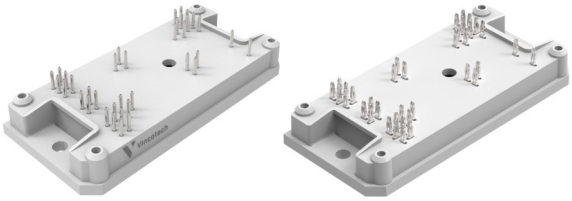
Target applications

- Solar inverter
- UPS

Types

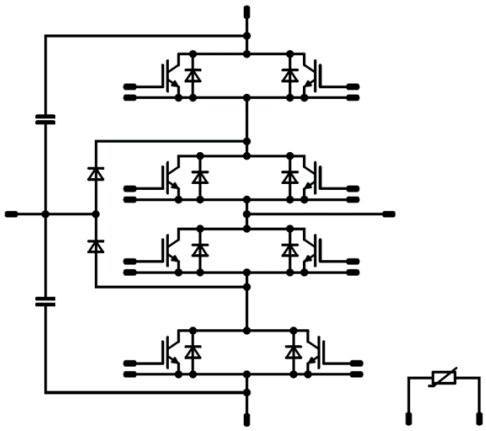
- 10-FY07NPA150SM02-L365F08
- 10-PY07NPA150SM02-L365F08Y

flow 1 12 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}		650	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	83	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	128	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	Condition	Value	Unit
Buck Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	87	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	113	W
Maximum junction temperature	T_{jmax}		175	°C
Out. Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	83	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	128	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Out. Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	87	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	113	W
Maximum junction temperature	T_{jmax}		175	°C
Out. Boost Inverse Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	106	A
Repetitive peak forward current	I_{FRM}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	149	W
Maximum junction temperature	T_{jmax}		175	°C
DC Link Capacitor				
Maximum DC voltage	V_{MAX}		630	V
Operation Temperature	T_{op}		-55…+125	°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		solder pin \ press-fit pin	8,07 \ 7,86	mm
Comparative Tracking Index	CTI		> 200	

*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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,70 1,88 1,93	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650		25			80	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		8600		pF
Output capacitance	C_{oes}							150		
Reverse transfer capacitance	C_{res}							32		
Gate charge	Q_g		15	520	150	25		332		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,74		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5 / 15	700	90	25 125 150		48 46 46		ns
Rise time	t_r					25 125 150		11 12 13		
Turn-off delay time	$t_{d(off)}$					25 125 150		133 152 156		
Fall time	t_f					25 125 150		7 7 8		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 3,8 µC Q_{rFWD} = 7,1 µC Q_{rFWD} = 8,1 µC				25 125 150		0,737 1,118 1,210		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,367 0,706 0,798		

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 Diode										
Static										
Forward voltage	V_F				150	25 125 150		1,67 1,67 1,66	1,77	V
Reverse leakage current	I_R			650		25			7,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,84		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 7000 A/µs di/dt = 7124 A/µs di/dt = 6971 A/µs	-5 / 15	700	90	25 125 150		110 143 151		A
Reverse recovery time	t_{rr}					25 125 150		52 85 96		ns
Recovered charge	Q_r					25 125 150		3,795 7,081 8,085		µC
Reverse recovered energy	E_{rec}					25 125 150		0,853 1,613 1,849		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		2642 2119 2131		A/µs

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	
Out. Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0015	25	3,3	4	4,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		150	25 125 150		1,70 1,88 1,93	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650		25			80	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		8600		pF
Output capacitance	C_{oes}							150		
Reverse transfer capacitance	C_{res}							32		
Gate charge	Q_g		15	520	150	25		332		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,74		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5 / 15	700	90	25 125 150		50 51 50		ns
Rise time	t_r					25 125 150		11 13 14		
Turn-off delay time	$t_{d(off)}$					25 125 150		114 134 139		
Fall time	t_f					25 125 150		5 7 8		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 3,6 µC Q_{rFWD} = 6,9 µC Q_{rFWD} = 7,9 µC				25 125 150		1,100 1,773 1,921		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		0,243 0,621 0,719		

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	
Out. Boost Diode										
Static										
Forward voltage	V_F				150	25 125 150		1,67 1,67 1,66	1,77	V
Reverse leakage current	I_R			650		25			7,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,84		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 5600 A/µs di/dt = 6000 A/µs di/dt = 5796 A/µs	-5 / 15	700	90	25 125 150		90 117 121		A
Reverse recovery time	t_{rr}					25 125 150		61 97 109		ns
Recovered charge	Q_r					25 125 150		3,603 6,937 7,941		µC
Reverse recovered energy	E_{rec}					25 125 150		0,692 1,331 1,529		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		1618 1020 864		A/µs
Out. Boost Inverse Diode										
Static										
Forward voltage	V_F				150	25 125 150		1,66 1,61 1,59	2	V
Reverse leakage current	I_R			650		25 150			1,8	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,64		K/W
DC Link Capacitor										
Capacitance	C							300		nF
Tolerance							-10		+10	%
Dissipation factor		f = 1 kHz				25			2,5	%

Characteristic Values

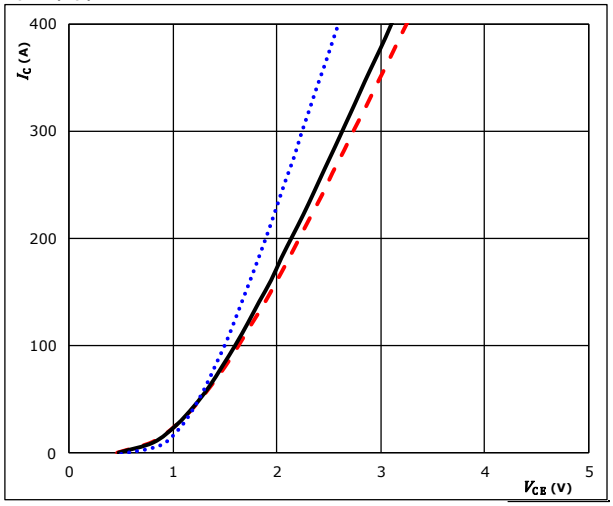
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
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

$I_C = f(V_{CE})$

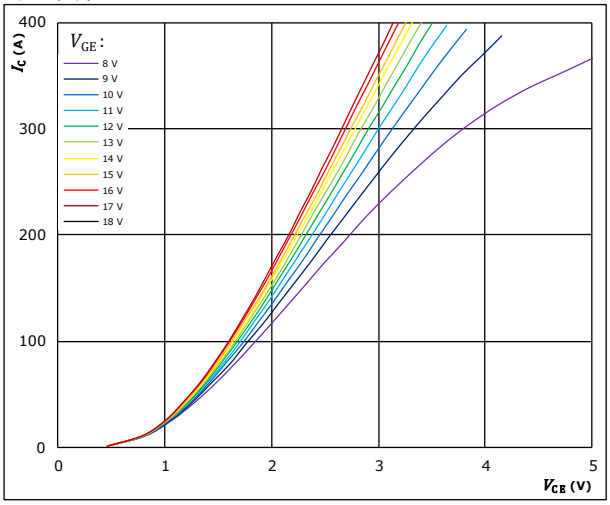


t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

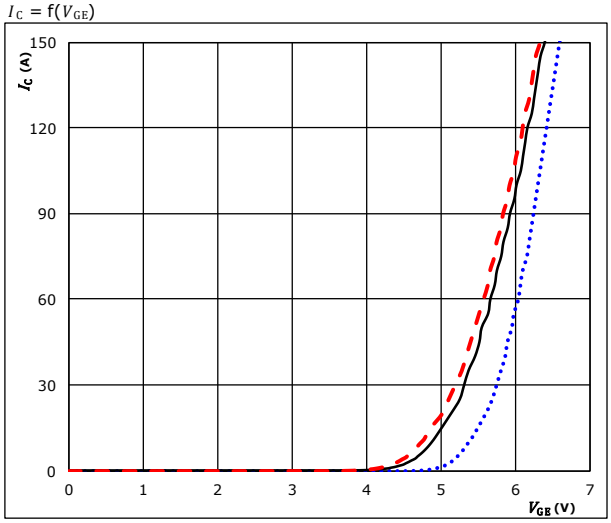


t_p =	250	µs
T_j =	150	°C
V_{GE} from	8 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

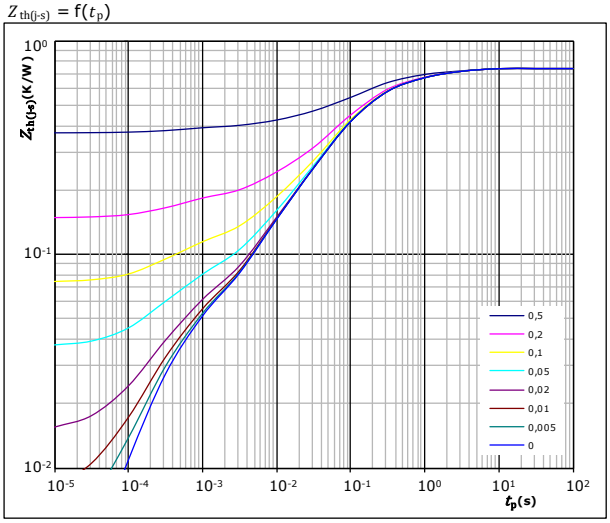


t_p =	100	µs		25 °C	
V_{CE} =	3634	V	T_j:	125 °C	
				150 °C	

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,74	K/W

IGBT thermal model values

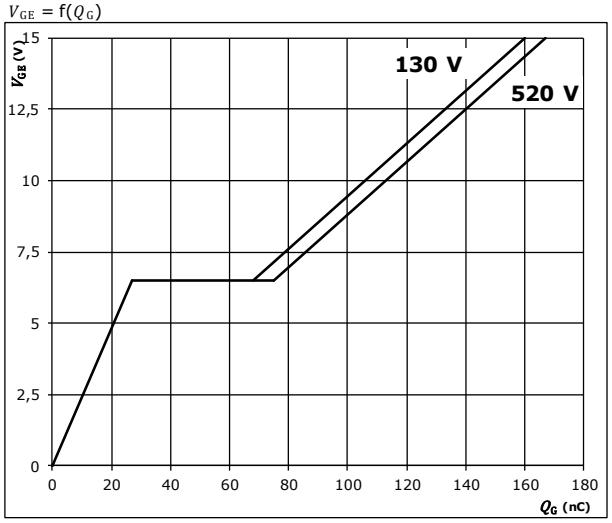
R (K/W)	τ (s)
1,09E-01	1,94E+00
2,21E-01	2,60E-01
2,87E-01	6,98E-02
8,43E-02	8,29E-03
3,94E-02	3,67E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

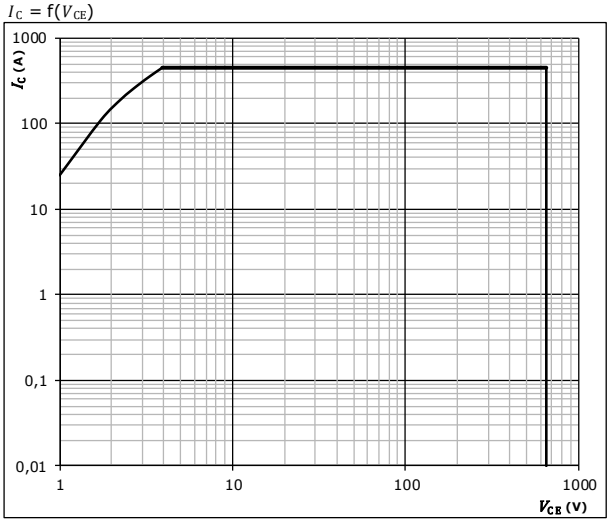


I_C = 150 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



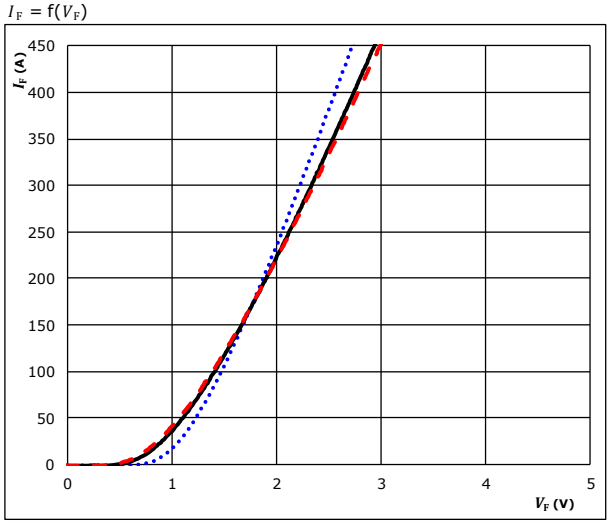
D = single pulse
T_s = 80 °C
V_{GE} = ±15 V
T_j = T_{jmax}

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



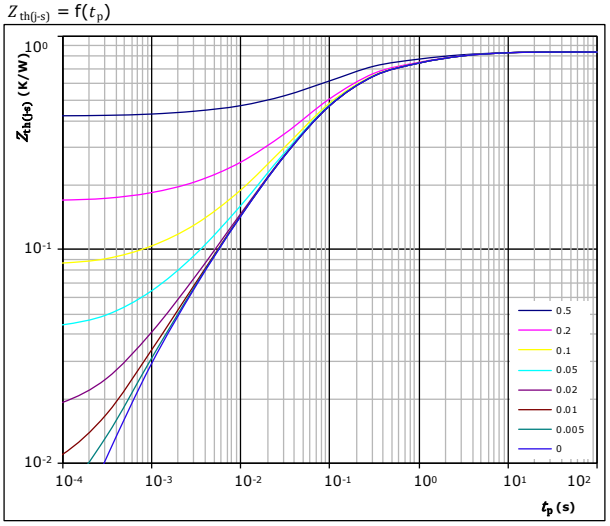
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,84 K/W

FWD thermal model values

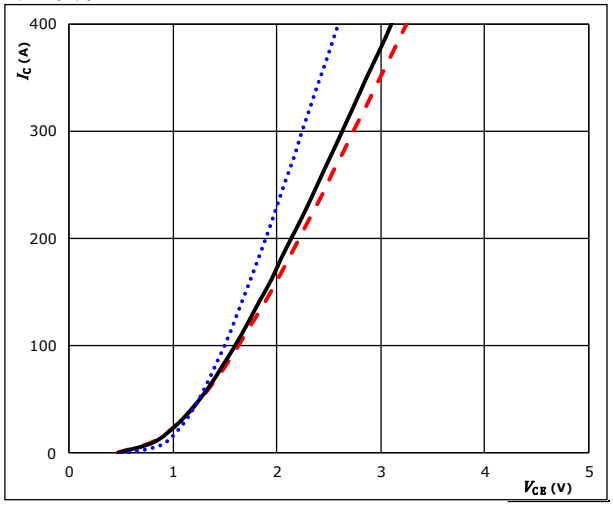
R (K/W)	τ (s)
6,09E-02	4,33E+00
1,45E-01	8,74E-01
3,25E-01	1,39E-01
2,06E-01	4,67E-02
8,27E-02	9,15E-03
2,35E-02	1,16E-03

Out. Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

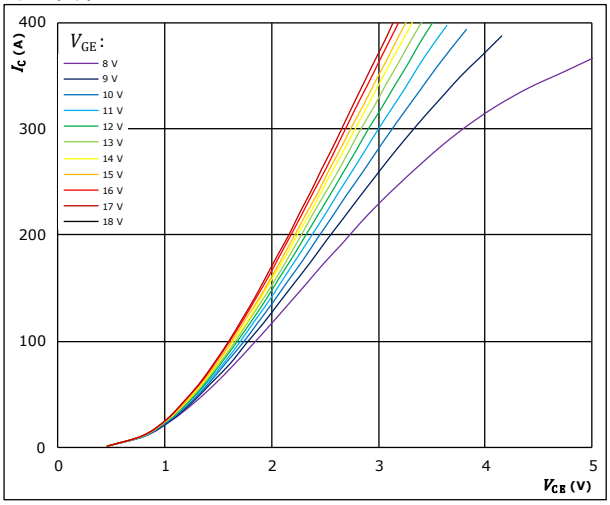


t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

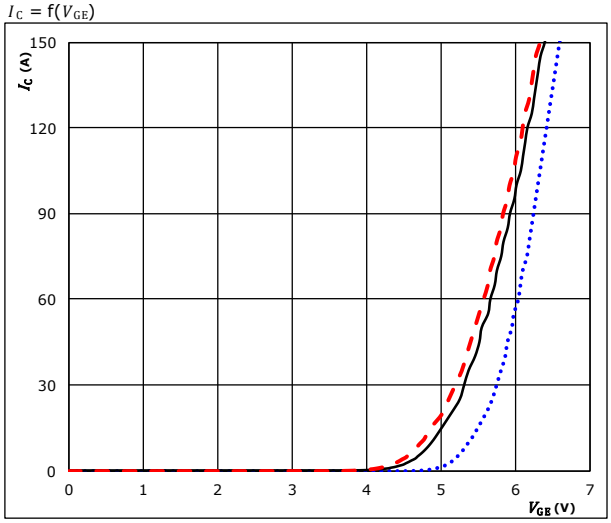


t_p =	250	µs
T_j =	150	°C
V_{GE} from	8 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

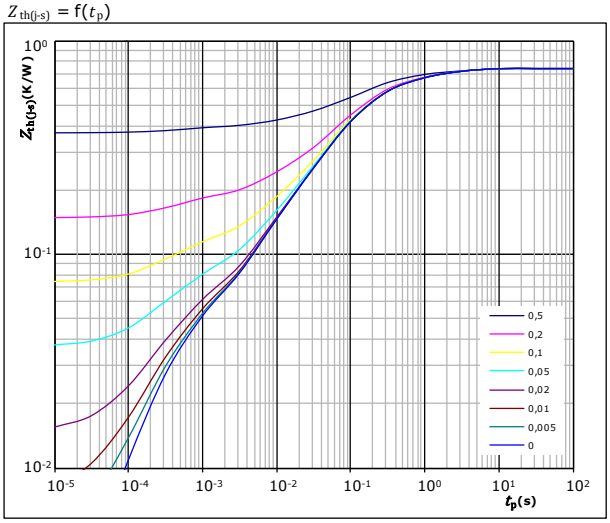


t_p =	100	µs		25 °C	
V_{CE} =	3634	V	T_j:	125 °C	
				150 °C	

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,74	K/W

IGBT thermal model values

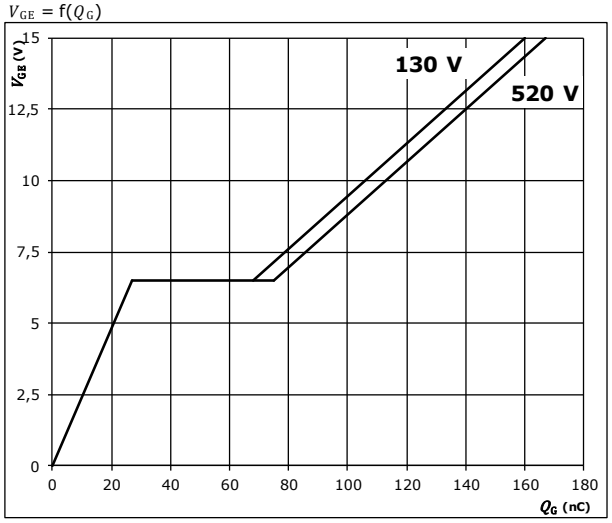
R (K/W)	τ (s)
1,09E-01	1,94E+00
2,21E-01	2,60E-01
2,87E-01	6,98E-02
8,43E-02	8,29E-03
3,94E-02	3,67E-04

Out. Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

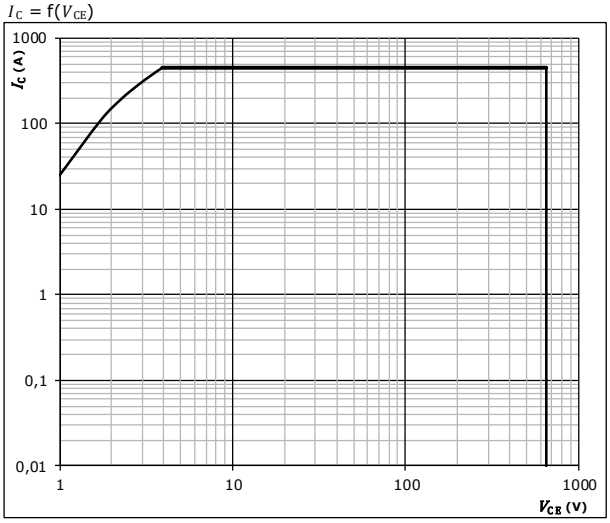


I_C = 150 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



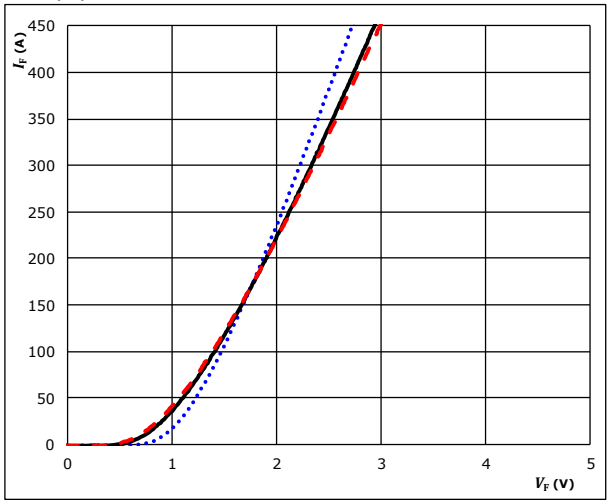
D = single pulse
T_s = 80 °C
V_{GE} = ±15 V
T_j = T_{jmax}

Out. Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



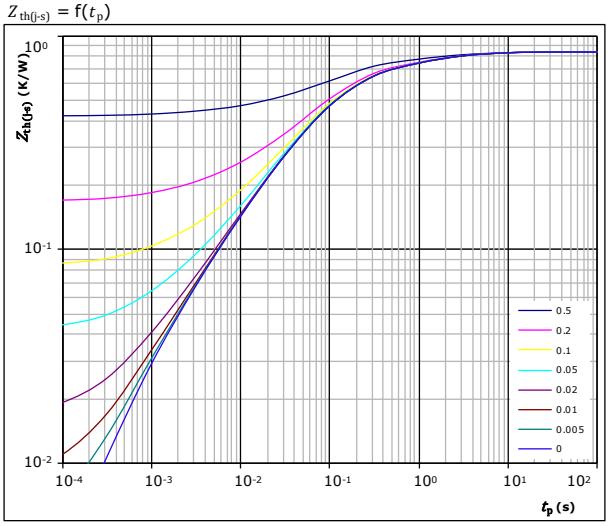
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,84 K/W

FWD thermal model values

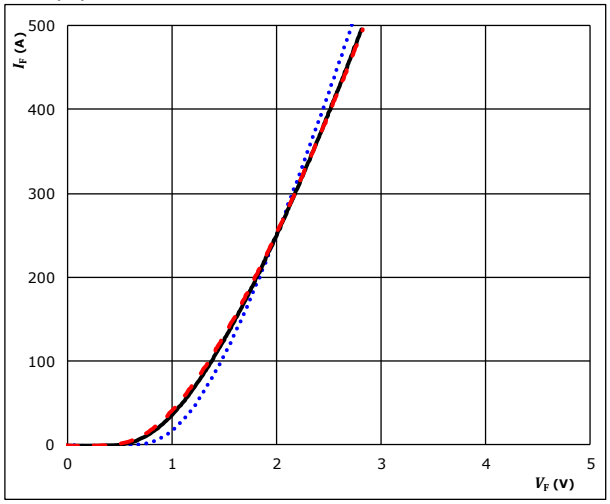
R (K/W)	τ (s)
6,09E-02	4,33E+00
1,45E-01	8,74E-01
3,25E-01	1,39E-01
2,06E-01	4,67E-02
8,27E-02	9,15E-03
2,35E-02	1,16E-03

Out. Boost Inverse Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



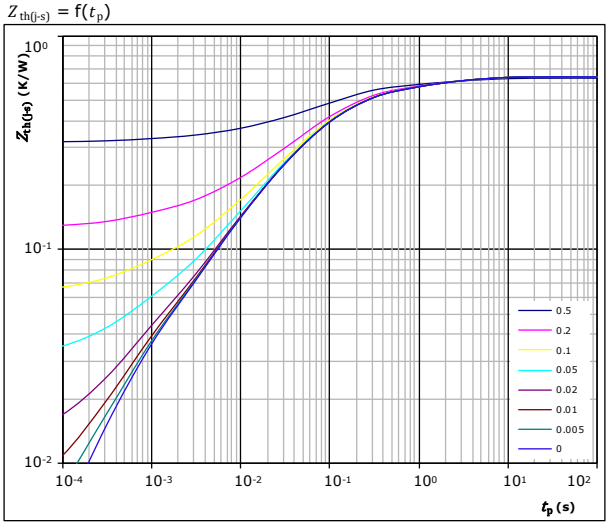
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,64 K/W

FWD thermal model values

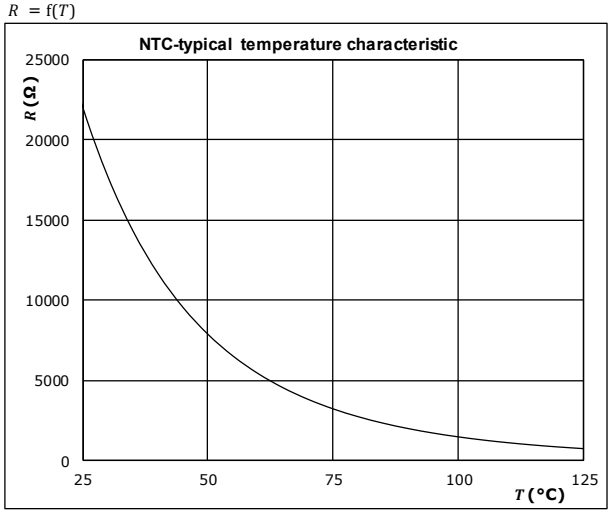
R (K/W)	τ (s)
6,14E-02	3,48E+00
1,03E-01	5,85E-01
2,81E-01	9,46E-02
1,21E-01	2,14E-02
4,83E-02	5,07E-03
2,26E-02	5,92E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

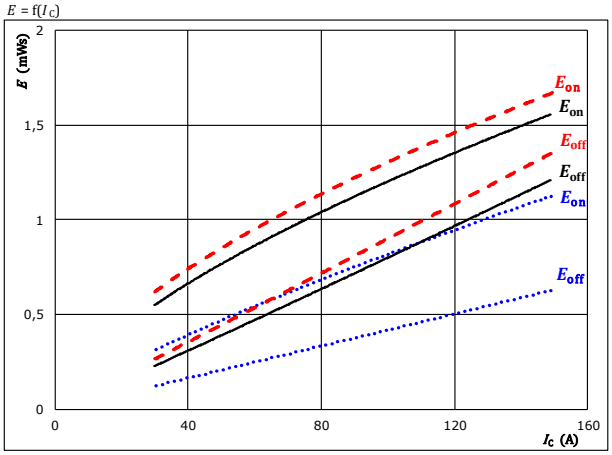


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



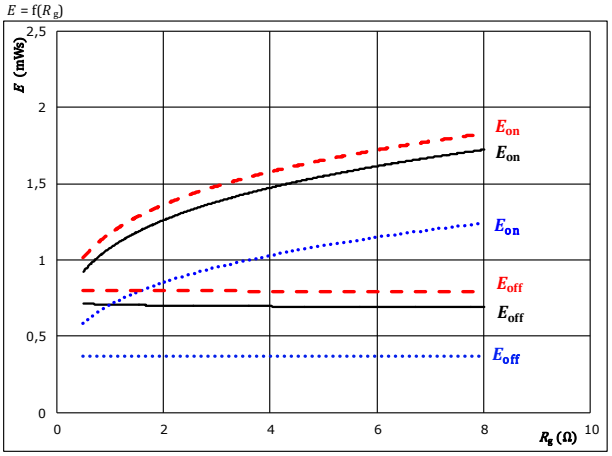
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



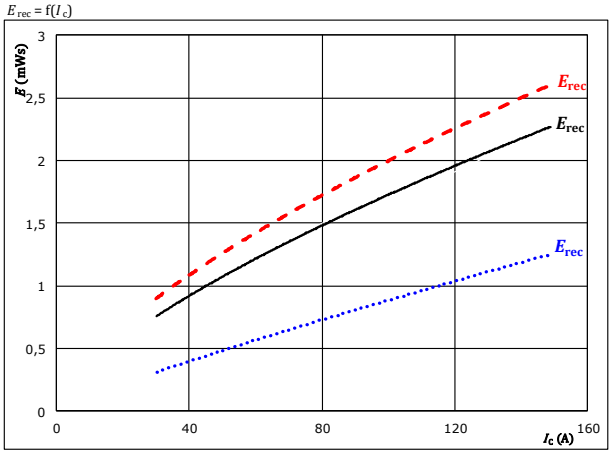
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



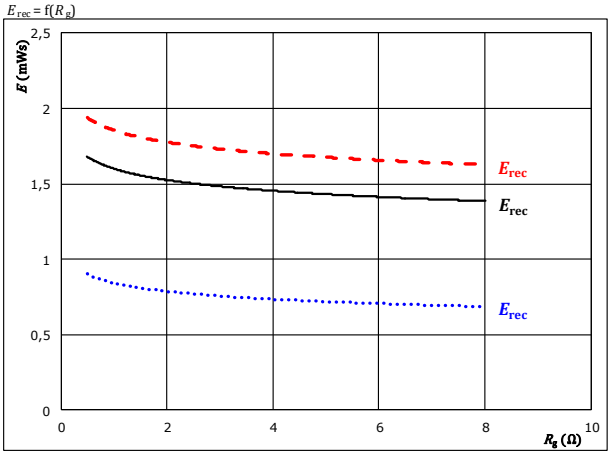
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

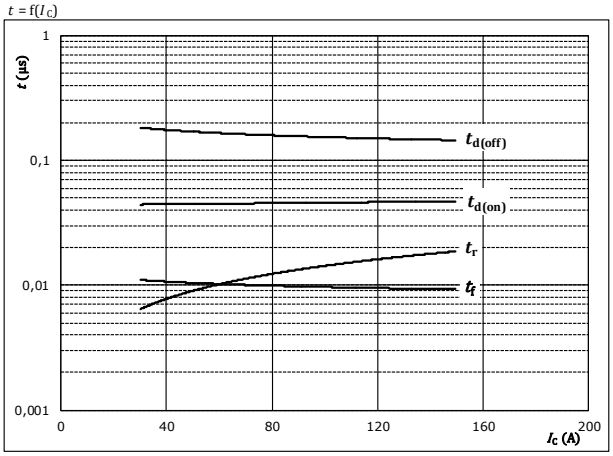
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



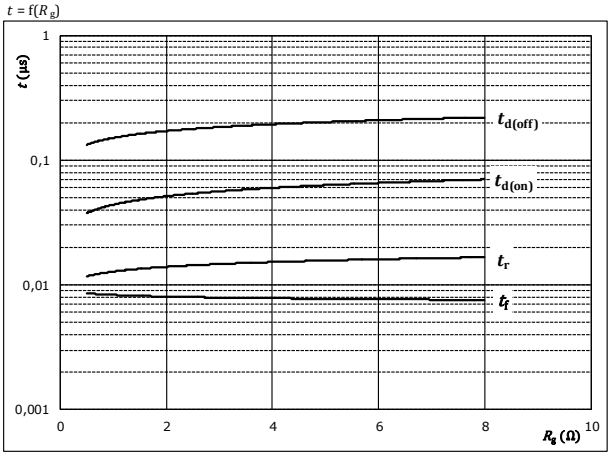
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	-5 / 15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



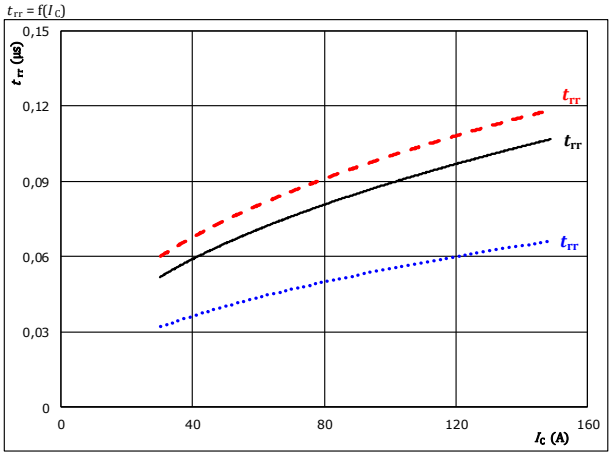
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	-5 / 15	V
I_C =	90	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



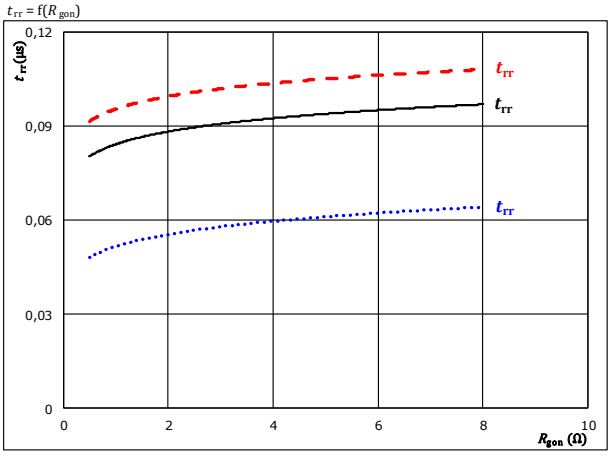
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 8. **FWD**

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

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



With an inductive load at

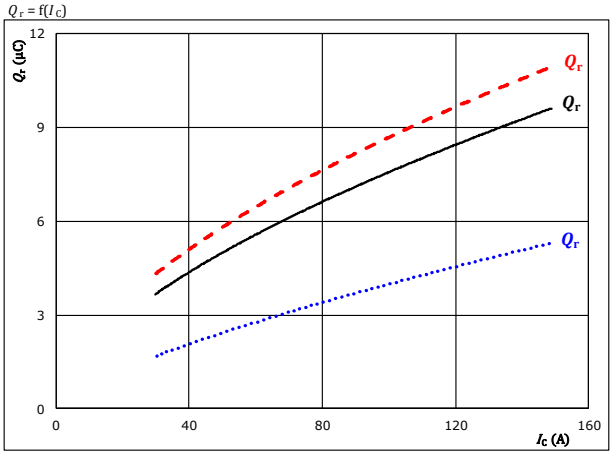
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



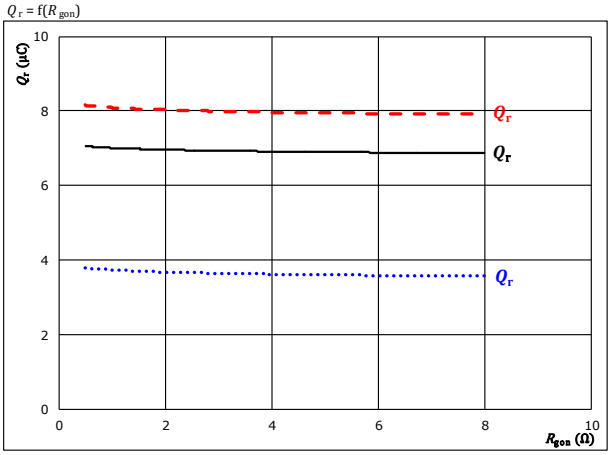
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C	
V_{GE} =	-5 / 15	V		125 °C	
R_{gon} =	2	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



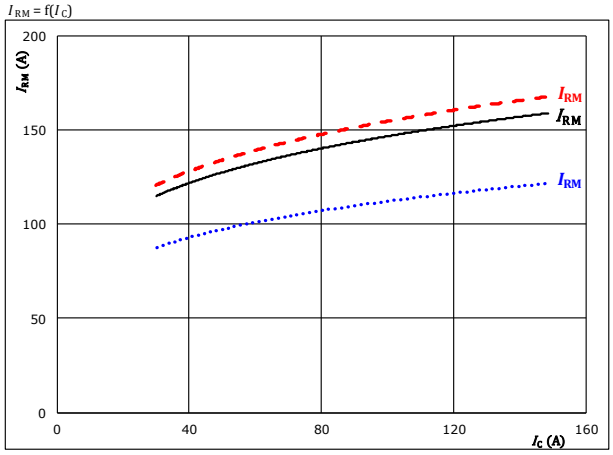
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C	
V_{GE} =	-5 / 15	V		125 °C	
I_C =	90	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



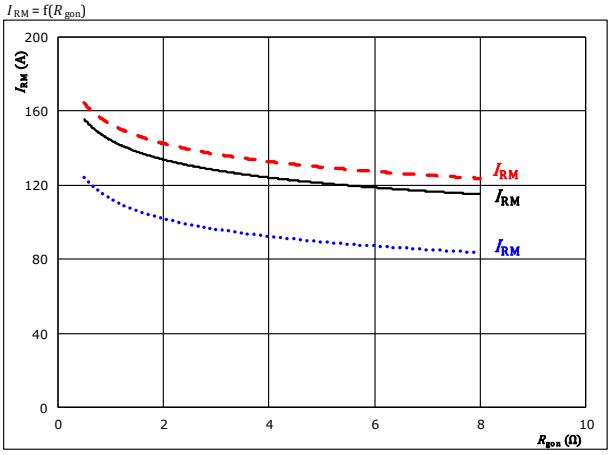
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C	
V_{GE} =	-5 / 15	V		125 °C	
R_{gon} =	2	Ω		150 °C	

figure 12. **FWD**

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

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



With an inductive load at

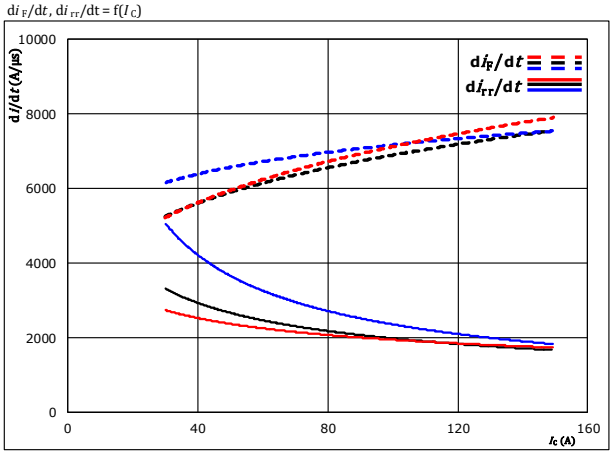
V_{CE} =	700	V	T_j:	25 °C	
V_{GE} =	-5 / 15	V		125 °C	
I_C =	90	A		150 °C	

Buck Switching Characteristics

figure 13. **FWD**

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

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



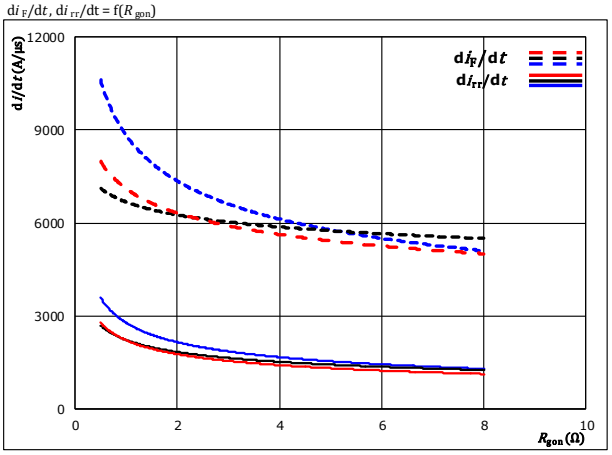
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	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

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



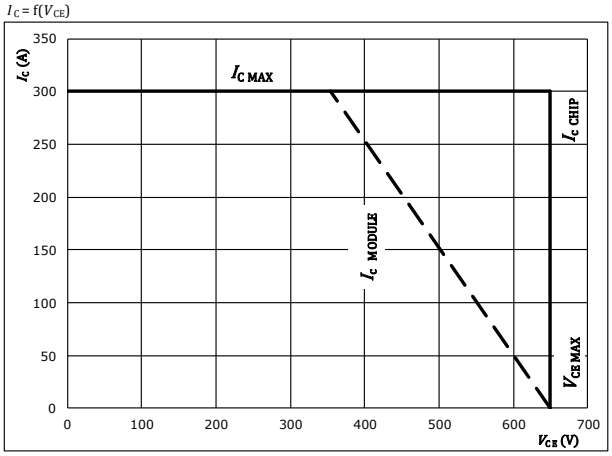
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

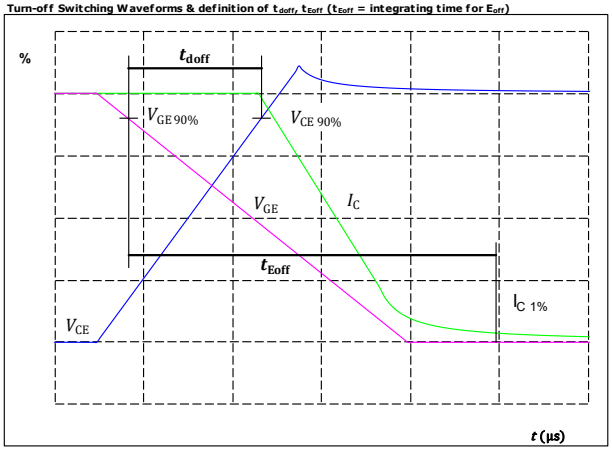
T_j =	125	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Buck Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT

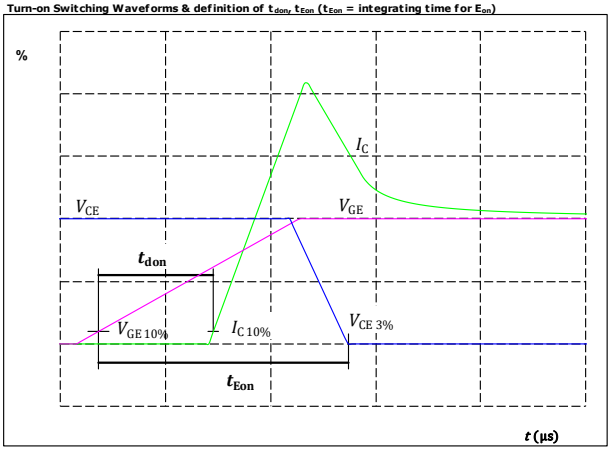
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_{doff} =	152	ns

figure 2. IGBT

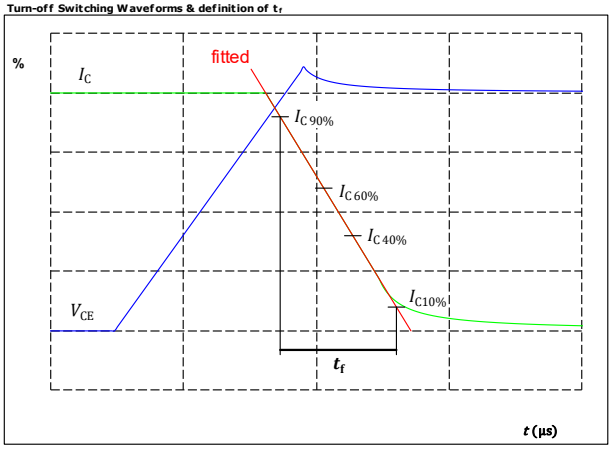
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_{don} =	46	ns

figure 3. IGBT

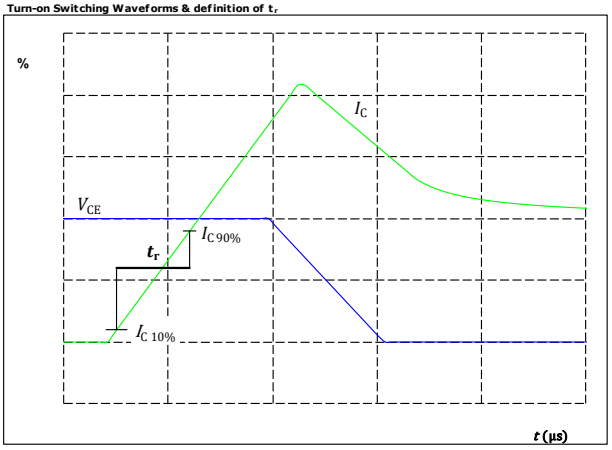
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_f =	7	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

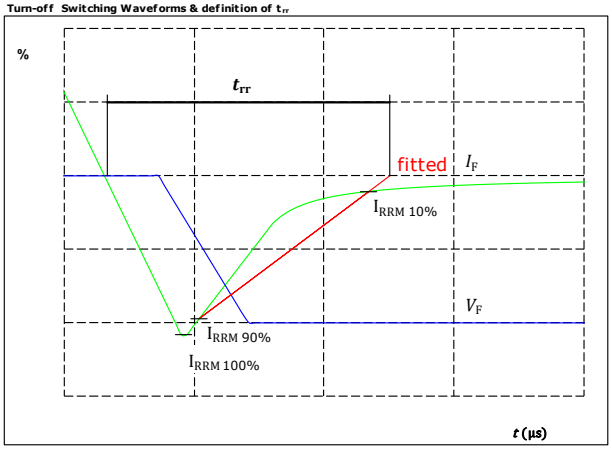


$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_r =	12	ns

Buck Switching Characteristics

figure 5. **FWD**

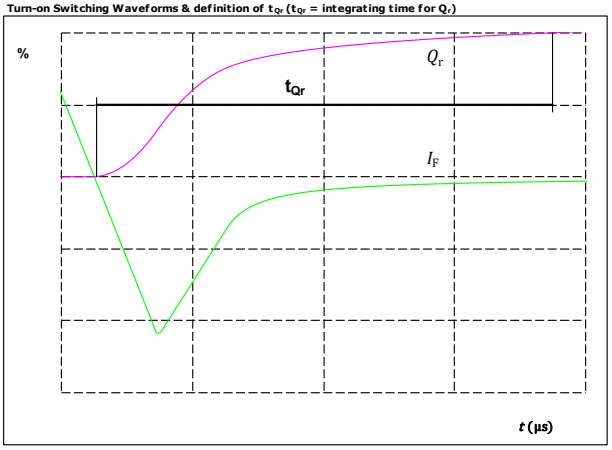
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%)$ =	700	V
$I_F(100\%)$ =	90	A
$I_{RRM}(100\%)$ =	143	A
t_{rr} =	85	ns

figure 6. **FWD**

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



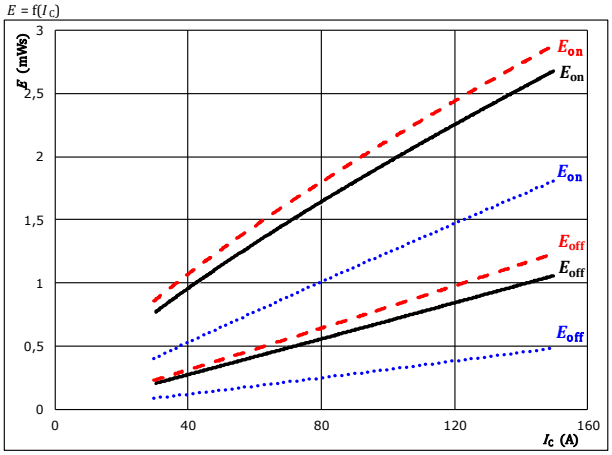
$I_F(100\%)$ =	90	A
$Q_r(100\%)$ =	7,08	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



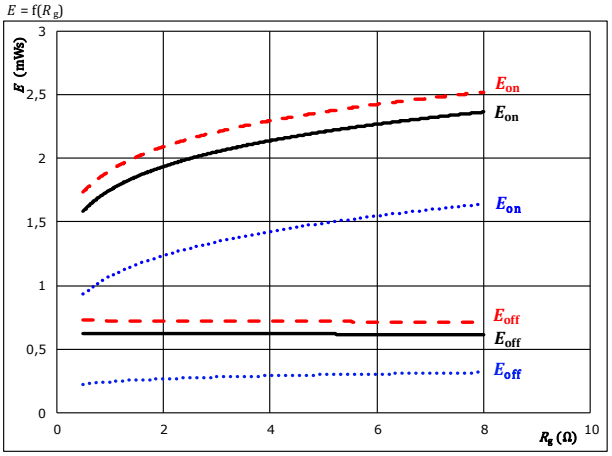
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



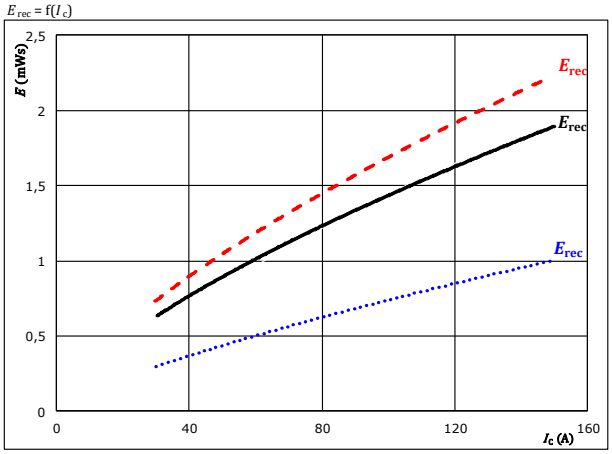
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



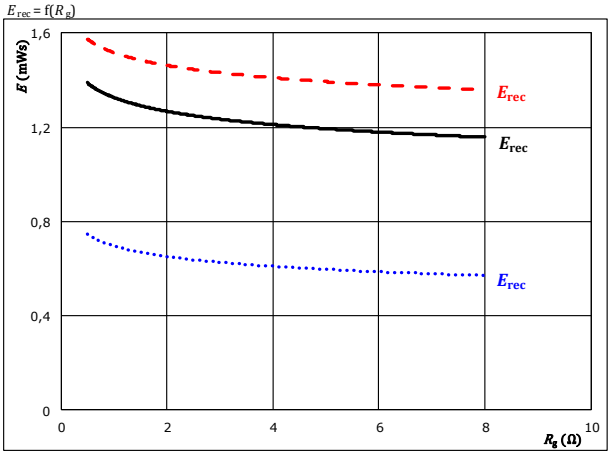
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

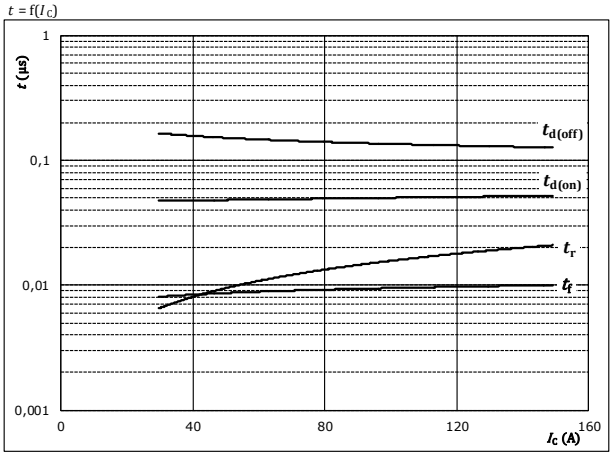
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



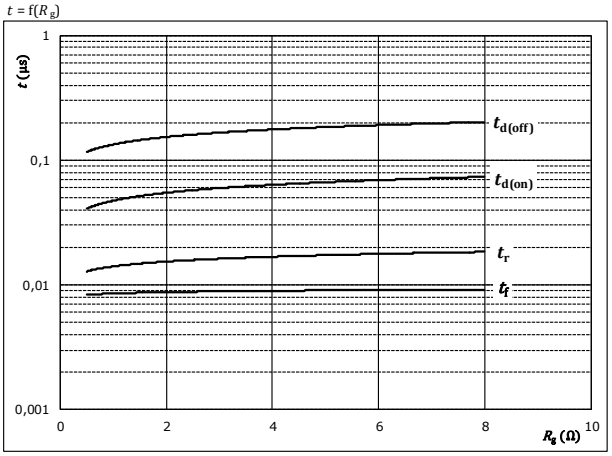
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	-5 / 15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



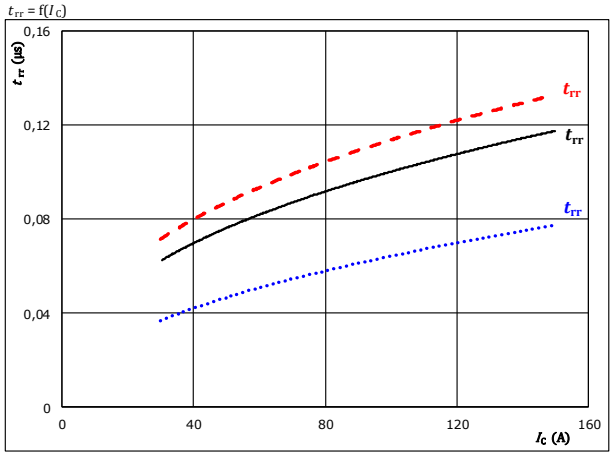
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	-5 / 15	V
I_C =	90	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



With an inductive load at

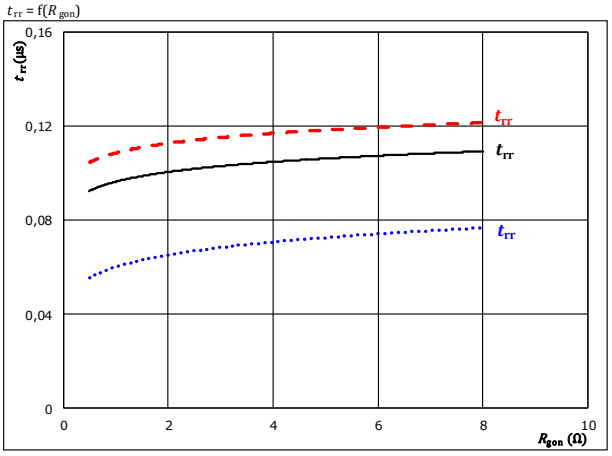
V_{CE} =	700	V
V_{GE} =	-5 / 15	V
R_{gon} =	2	Ω

T_j:	
25 °C	·····
125 °C	———
150 °C	– – – –

figure 8. **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} =	700	V
V_{GE} =	-5 / 15	V
I_C =	90	A

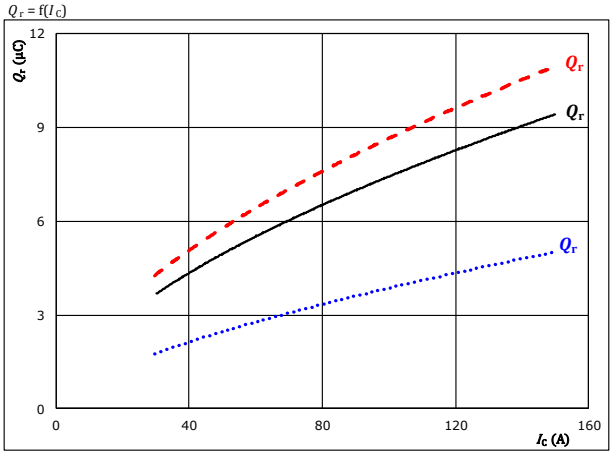
T_j:	
25 °C	·····
125 °C	———
150 °C	– – – –

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



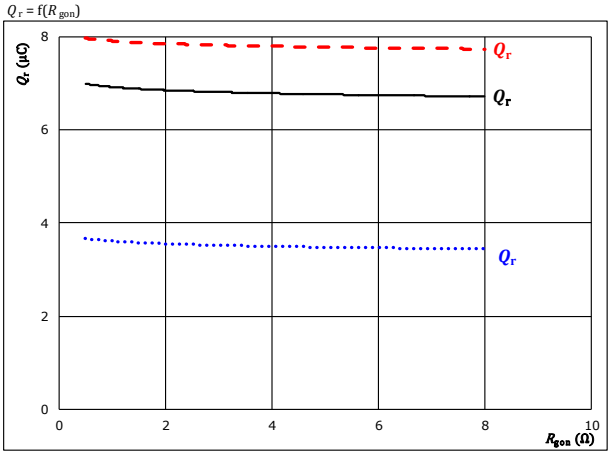
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



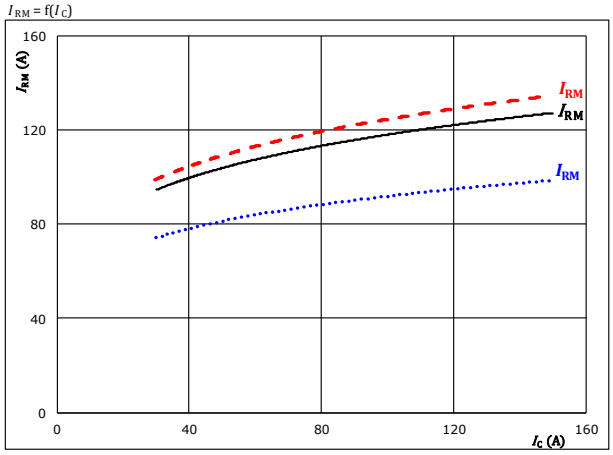
With an inductive load at

V_{CE}=	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C=	90	A		150 °C

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



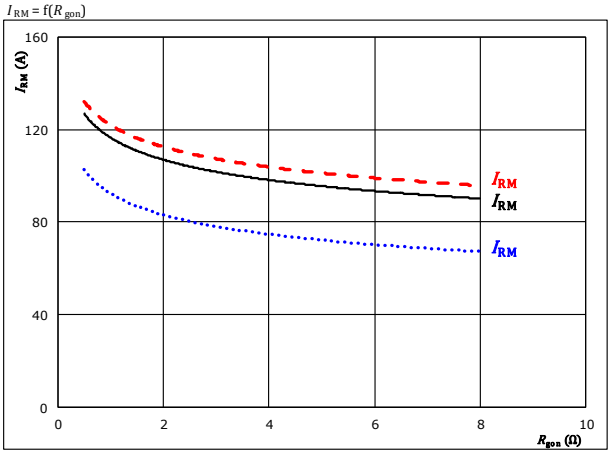
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 12. **FWD**

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

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



With an inductive load at

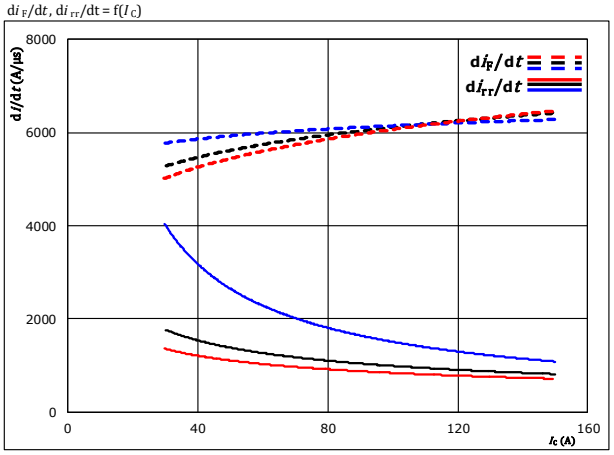
V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

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



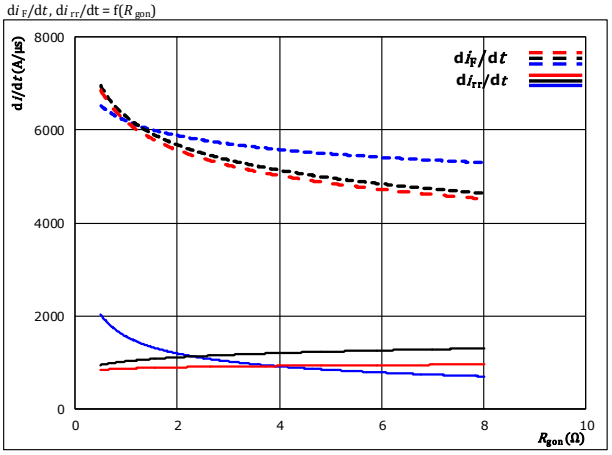
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	2	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, $di_{rr}/dt = f(R_{gon})$



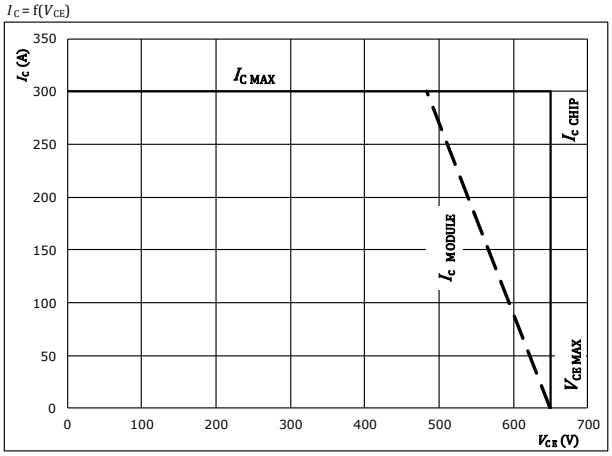
With an inductive load at

V_{CE} =	700	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	90	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	125	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

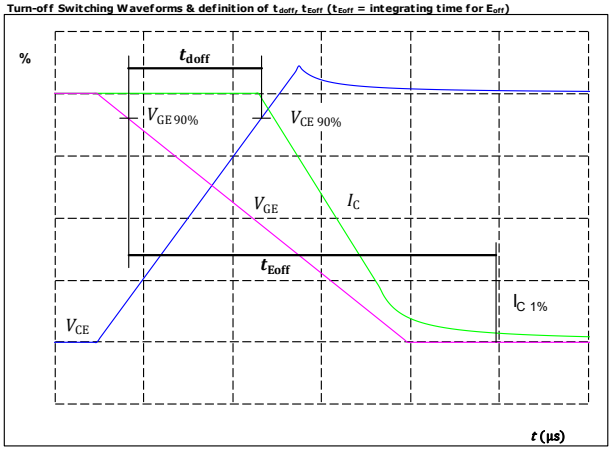
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT

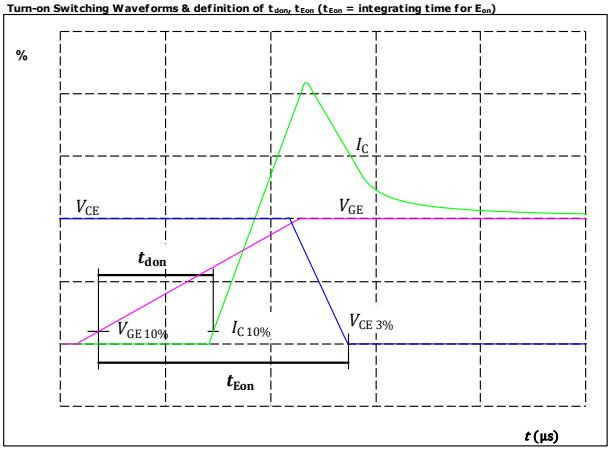
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_{doff} =	134	ns

figure 2. IGBT

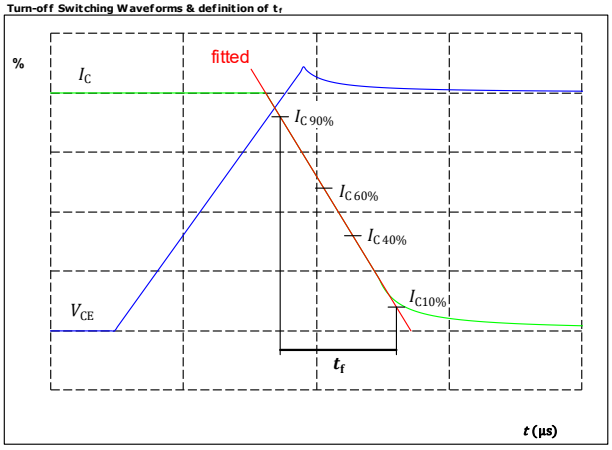
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_{don} =	51	ns

figure 3. IGBT

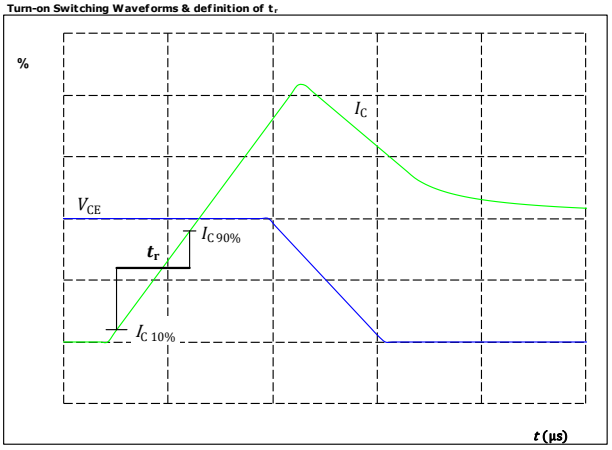
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_f =	7	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

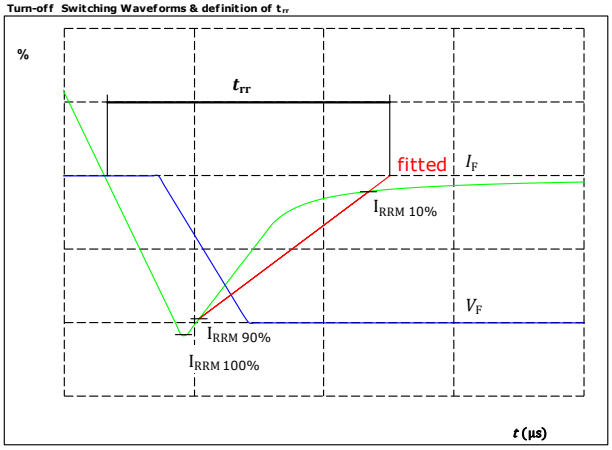


$V_C(100\%)$ =	700	V
$I_C(100\%)$ =	90	A
t_r =	13	ns

Boost Switching Characteristics

figure 5. **FWD**

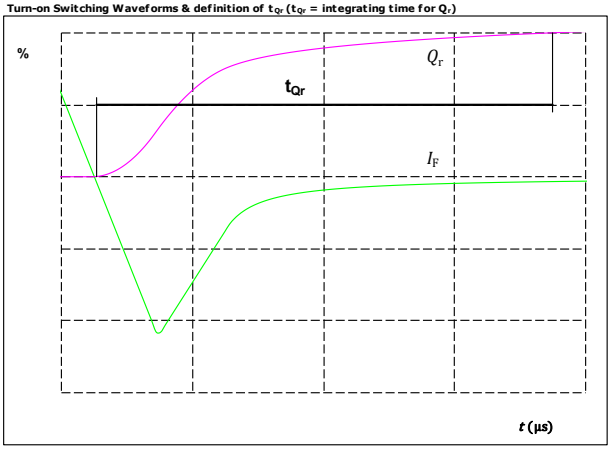
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%)$ =	700	V
$I_F(100\%)$ =	90	A
$I_{RRM}(100\%)$ =	117	A
t_{rr} =	97	ns

figure 6. **FWD**

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



$I_F(100\%)$ =	90	A
$Q_r(100\%)$ =	6,94	µC

Ordering Code & Marking

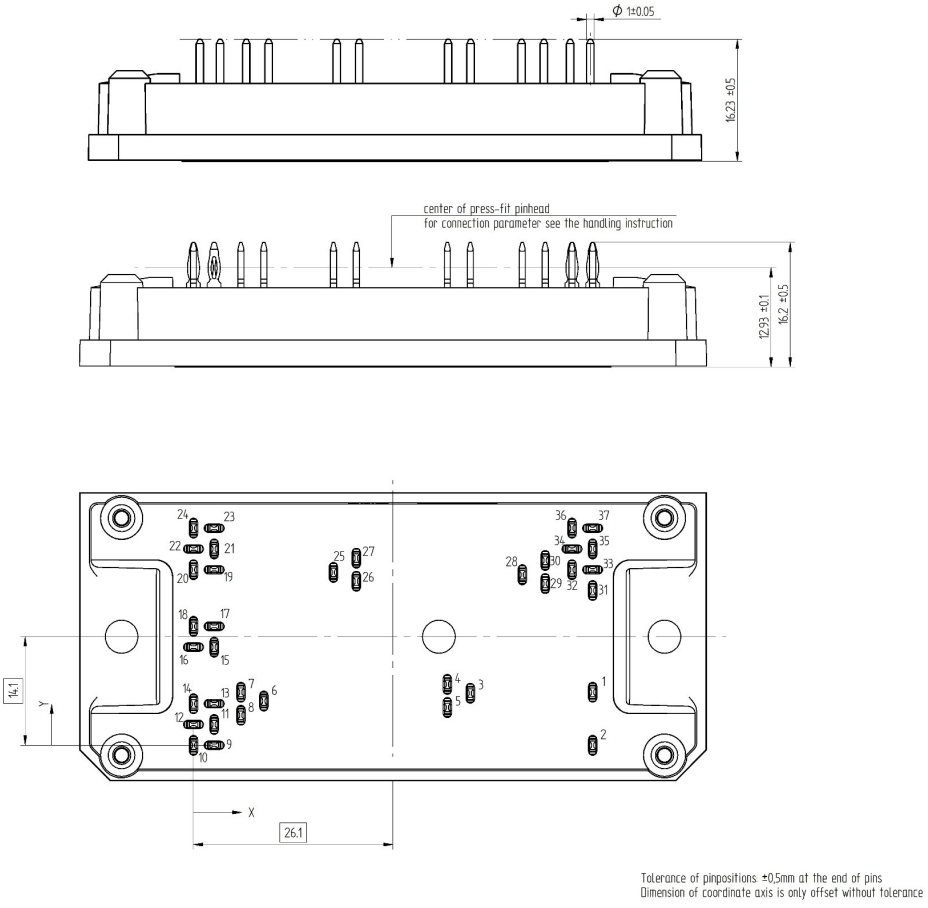
Version	Ordering Code
without thermal paste 12mm housing with solder pins	10-FY07NPA150SM02-L365F08
without thermal paste 12mm housing with press-fit pins	10-PY07NPA150SM02-L365F08Y
with thermal paste 12mm housing with solder pins	10-FY07NPA150SM02-L365F08-/3/
with thermal paste 12mm housing with press-fit pins	10-PY07NPA150SM02-L365F08Y-/3/

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

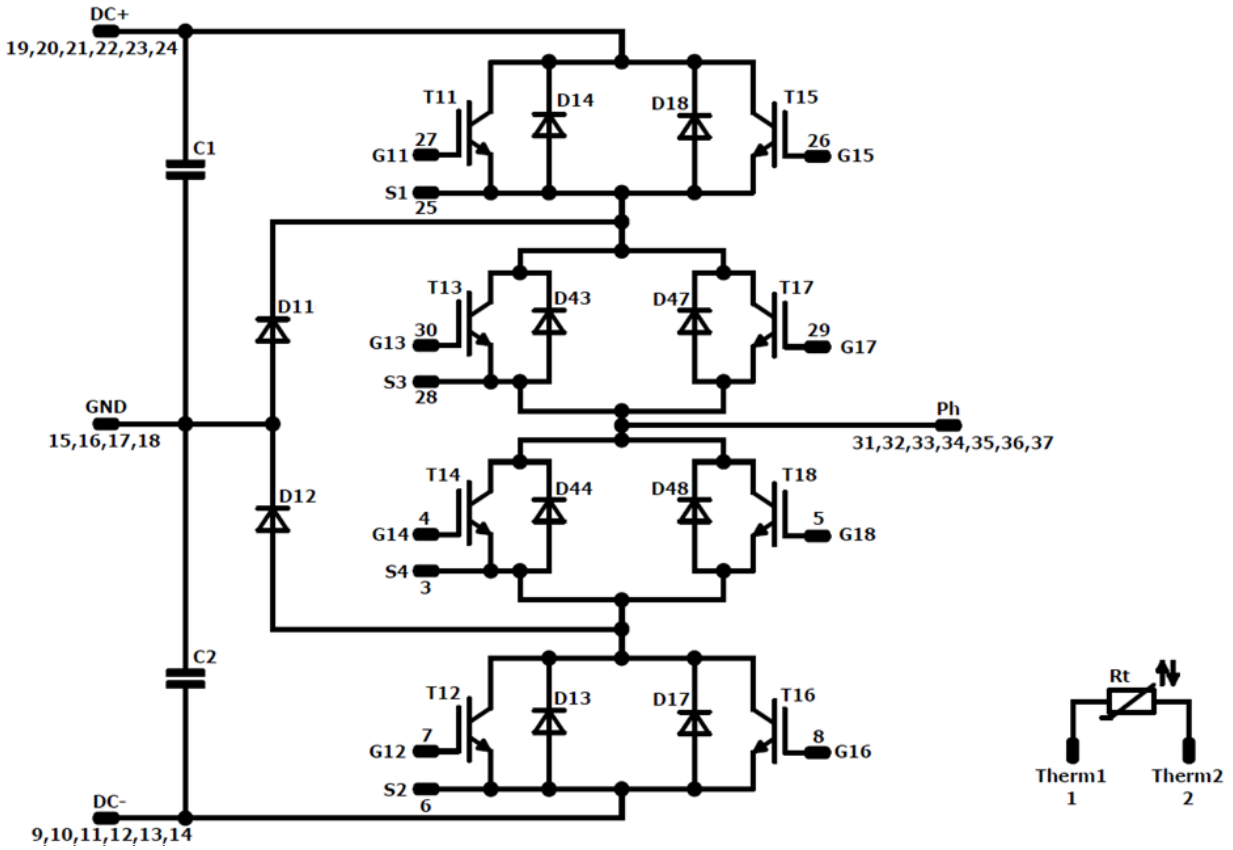
Outline

Pin table

Pin	X	Y	Function
1	52,2	6,9	Therm1
2	52,2	0	Therm2
3	36,2	6,75	S4
4	33,2	7,9	G14
5	33,2	4,9	G18
6	9,2	5,75	S2
7	6,2	6,9	G12
8	6,2	3,9	G16
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	2,7	12,75	GND
16	0	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	S1
26	21,3	21,3	G15
27	21,3	24,3	G11
28	43	22,15	S3
29	46	21	G17
30	46	24	G13
31	52,2	20,1	Ph
32	49,5	22,8	Ph
33	52,2	22,8	Ph
34	49,5	25,5	Ph
35	52,2	25,5	Ph
36	49,5	28,2	Ph
37	52,2	28,2	Ph



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T15, T16	IGBT	650V	75A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650V	100A	Buck Diode	
T13, T14, T17, T18	IGBT	650V	75A	Out. Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D14, D17, D18	FWD	650V	50A	Out. Boost Diode	Parallel devices. Values apply to complete device.
D43, D44, D47, D48	FWD	650V	50A	Out. Boost Inverse Diode	Parallel devices. Values apply to complete device.
C1, C2	Capacitor	630V	-	DC Link Capacitor	
Rt	NTC	-	-	Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for if no series packaging available packages see vincotech.com website.

Package data
Package data for if no series packaging available 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
10-xY07NPA150SM02-L365F08x-D7-14	22 Jul. 2020	Correct Parallel devices in Identification table	29