Vincotech

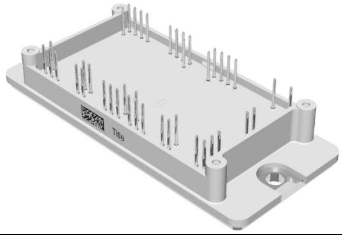
30-F2127PA075SC-L178E09
datasheet

flow **7PACK 2** **1200 V / 75 A**

Features

- Compact Flow 2 housing
- Trench Fieldstop IGBT4 Technology
- Compact and Low Inductance Design
- Built-in NTC

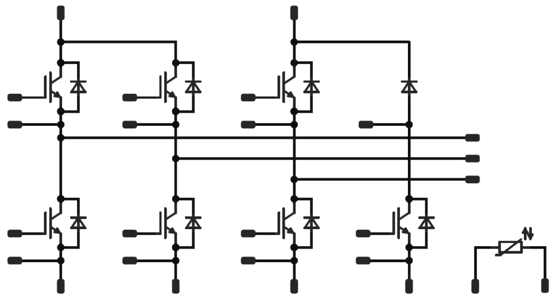
flow 2 17mm housing



Target applications

- Motor Drives
- Power Generation

Schematic



Types

- 30-F2127PA075SC-L178E09

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current	I_C	$T_j=T_j$max	T_S=80°C	85	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_j$max		225	A
Total power dissipation	P_{tot}	$T_j=T_j$max	T_S=80°C	232	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Inverter Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	85	A
Repetitive peak forward current	I_{FRM}			150	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	154	W
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Condition		Value	Unit
Brake Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current	I_C	$T_j=T_j$max	T_S=80°C	65	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_j$max		150	A
Total power dissipation	P_{tot}	$T_j=T_j$max	T_S=80°C	185	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Brake Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	38	A
Repetitive peak forward current	I_{FRM}			50	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	87	W
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Brake Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	15	A
Repetitive peak forward current	I_{FRM}			15	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	39	W
Maximum Junction Temperature	T_{jmax}			150	°C

Module Properties

Parameter	Symbol	Conditions		Value	Unit
Thermal Properties					
Storage temperature	T_{stg}			-40...+125	°C
Operation Junction Temperature	T_{jop}			-40...+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	DC voltage	t_p=2s	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative Tracking Index	CTI			>200	

Characteristic Values

Inverter Switch

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,0026	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150	1,58	1,92 - 2,39	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			1	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Internal gate resistance	r_g							10		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		4300		pF
Reverse transfer capacitance	C_{res}	f=1 MHz	0	25		25		160		pF

IGBT Switching

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	600	75	25 150		178 196		ns
Rise time	t_r					25 150		34 36		ns
Turn-off delay time	$t_{d(off)}$					25 150		284 373		ns
Fall time	t_f					25 150		63 124		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 6,6 µC Q_{rFWD} = 14,1 µC				25 150		6,174 9,393		mWs
Turn-off energy (per pulse)	E_{off}					25 150		4,009 6,991		mWs

Thermal

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,41		K/W

Inverter Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				75	25 125 150		1,75 - 1,72	2,05	V
Reverse leakage current	I_r			1200		25 150			14 -	µA
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 2443 A/µs di/dt = 2277 A/µs	±15	600	75	25 150		69 86		A
Reverse recovery time	t_{rr}					25 150		275 457		ns
Recovered charge	Q_r					25 150		6,624 14,075		µC
Reverse recovered energy	E_{rec}					25 150		2,287 5,224		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		1859 724		A/µs
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,62		K/W

Brake Switch

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}			0,0017	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 125 150	1,58	1,88 - 2,30	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			10	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			600	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}	f=1MHz	0	25		25		2800		pF
Reverse transfer capacitance	C_{res}	f=1MHz	0	25		25		100		pF
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	600	50	25 150		98 103		ns
Rise time	t_r	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	600	50	25 150		18 25		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	600	50	25 150		208 284		ns
Fall time	t_f	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	600	50	25 150		66 112		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 3,1 µC Q_{rFWD} = 6,3 µC	±15	600	50	25 150		2,425 3,461		mWs
Turn-off energy (per pulse)	E_{off}		±15	600	50	25 150		2,451 4,226		mWs
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,51		K/W

Brake Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				25	25 125 150		1,90 1,90 1,88	2,05	V
Reverse leakage current	I_r			1200		25 150			5,2 -	µA
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 3312 A/µs di/dt = 2285 A/µs	±15	600	50	25 150		51 52		A
Reverse recovery time	t_{rr}					25 150		152 328		ns
Recovered charge	Q_r					25 150		3,074 6,302		µC
Reverse recovered energy	E_{rec}					25 150		1,160 2,656		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		3443 806		A/µs
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						1,09		K/W

Brake Inverse Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				8	25 125 150		1,65 1,61 -		V
Reverse leakage current	I_r			1200		25 150			250 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						1,79		K/W

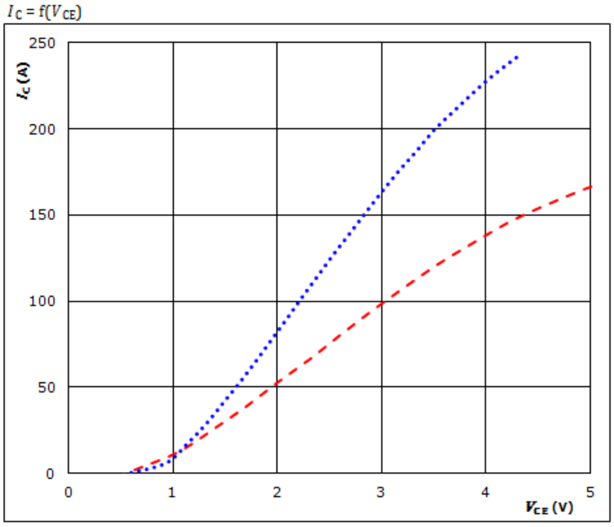
Thermistor

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	
Rated resistance	R					25		21,5		kΩ
Deviation of R100	$\Delta_{R/R}$	R100=1486 Ω				100	-4,5		+4,5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	$B_{(25/50)}$					25		3884		K
B-value	$B_{(25/100)}$					25		3964		K
Vincotech NTC Reference									F	

Inverter Switch Characteristics

Typical output characteristics IGBT

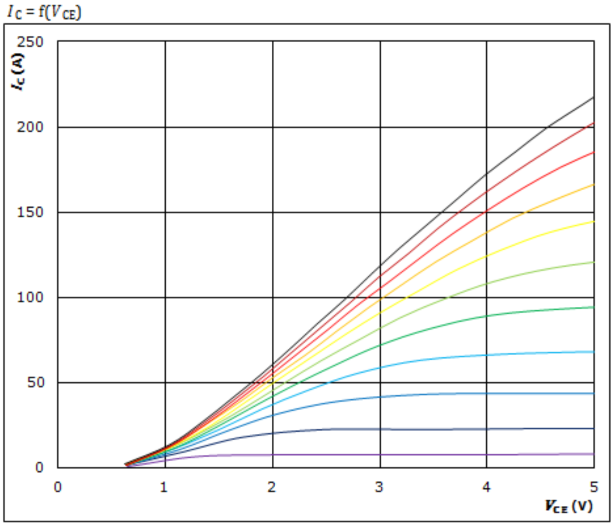
$I_C = f(V_{CE})$



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

Typical output characteristics IGBT

$I_C = f(V_{CE})$



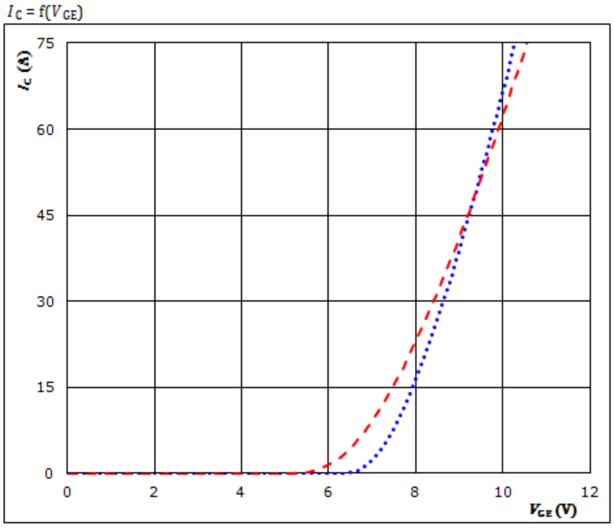
t_p = 250 µs

T_j = 150 °C

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

Typical transfer characteristics IGBT

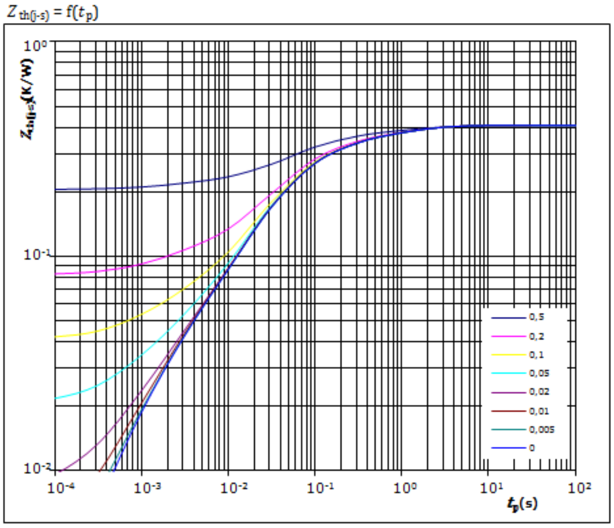
$I_C = f(V_{GE})$



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

Transient Thermal Impedance as function of Pulse duration IGBT

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



D = t_p / T

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

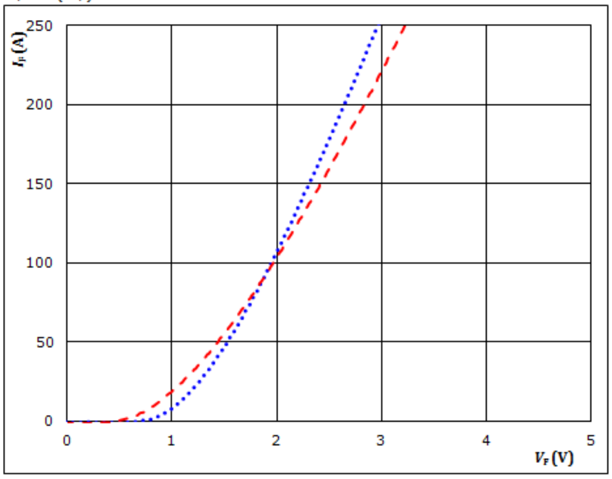
IGBT thermal model values

R_{th} (K/W)	τ (s)
6,08E-02	1,41E+00
9,91E-02	1,99E-01
1,78E-01	4,61E-02
5,03E-02	1,41E-02
2,16E-02	1,42E-03

Inverter Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

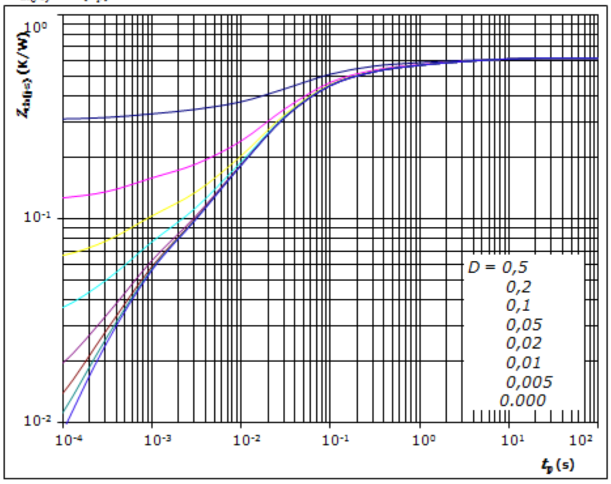


t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



D = t_p / T
$R_{th(j-s)}$ = 0,62 K/W

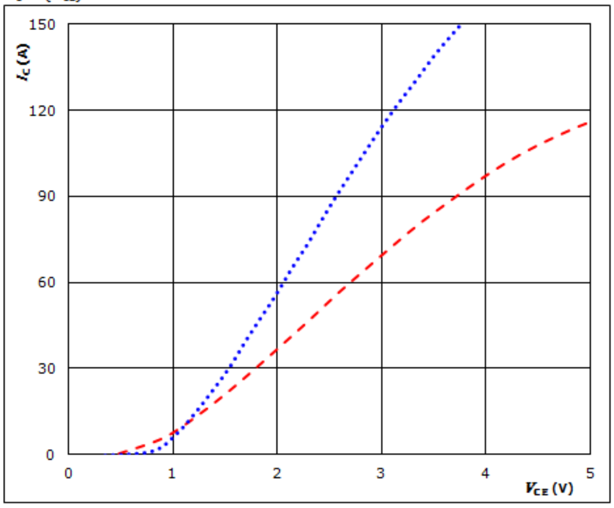
FWD thermal model values

R (K/W)	τ (s)
4,35E-02	4,66E+00
7,48E-02	5,44E-01
1,95E-01	8,13E-02
2,13E-01	2,26E-02
4,51E-02	5,48E-03
4,51E-02	5,92E-04

Brake Switch Characteristics

Typical output characteristics **IGBT**

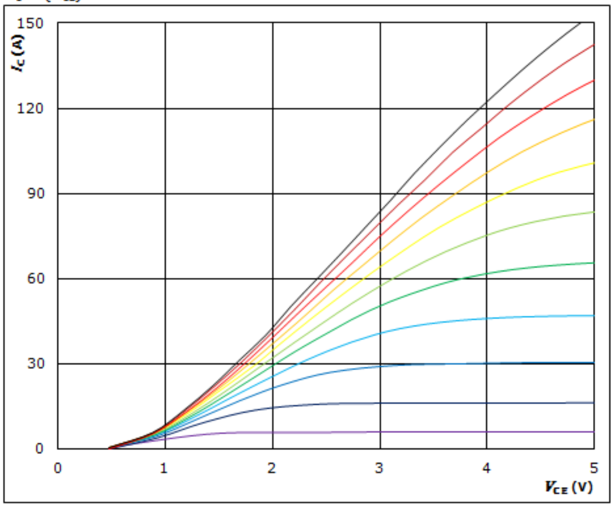
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

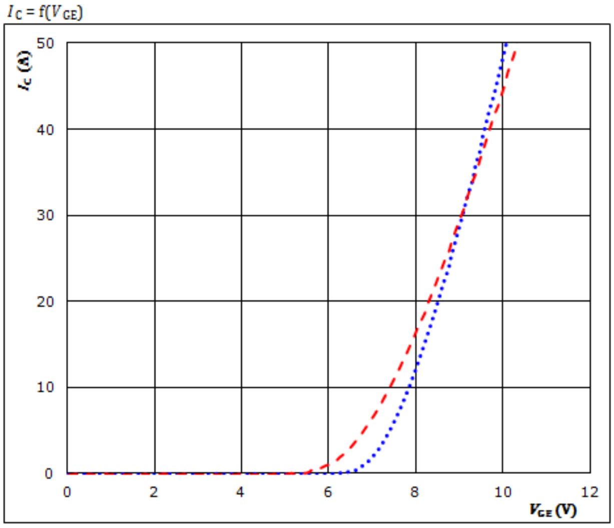
$I_C = f(V_{CE})$



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

Typical transfer characteristics **IGBT**

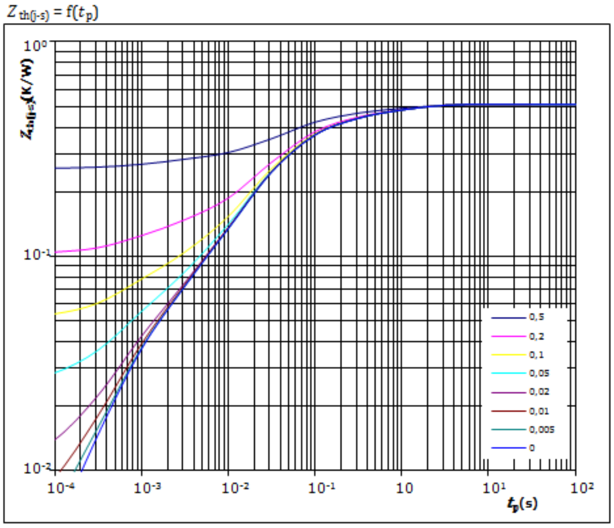
$I_C = f(V_{GE})$



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

Transient Thermal Impedance as function of Pulse duration **IGBT**

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,51 K/W

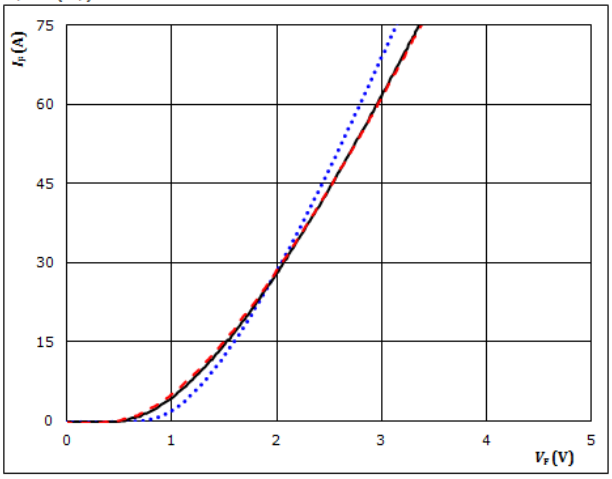
IGBT thermal model values

R_{th} (K/W)	τ (s)
7,12E-02	1,13E+00
1,15E-01	1,65E-01
2,22E-01	3,78E-02
6,59E-02	1,21E-02
3,86E-02	9,52E-04

Brake Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

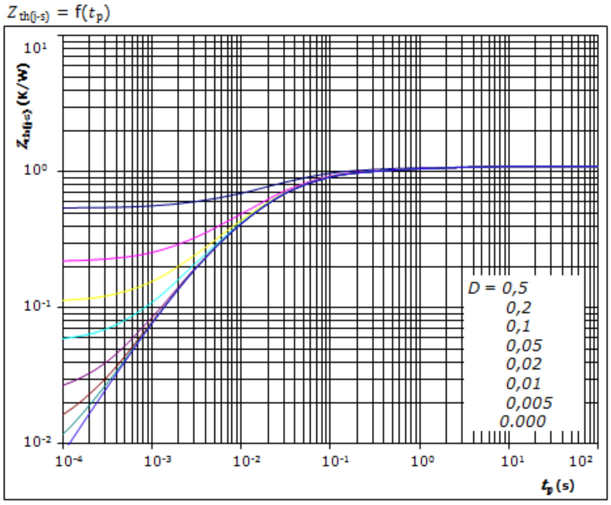


t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,09 K/W

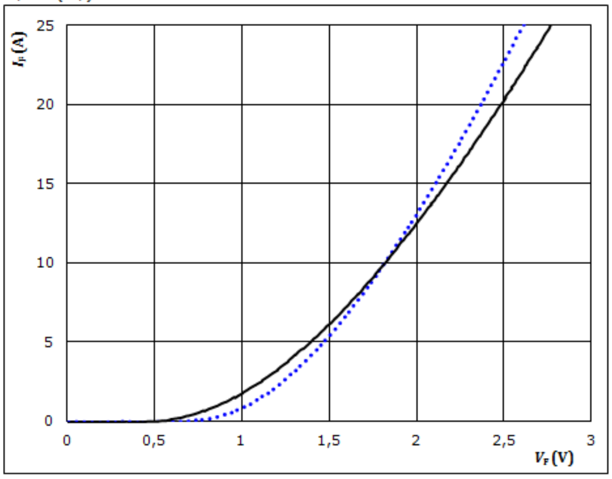
FWD thermal model values

R (K/W)	τ (s)
5,34E-02	2,93E+00
9,71E-02	3,59E-01
4,43E-01	4,79E-02
3,93E-01	1,21E-02
1,05E-01	2,46E-03
1,50E-01	3,85E-04

Brake Inverse Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

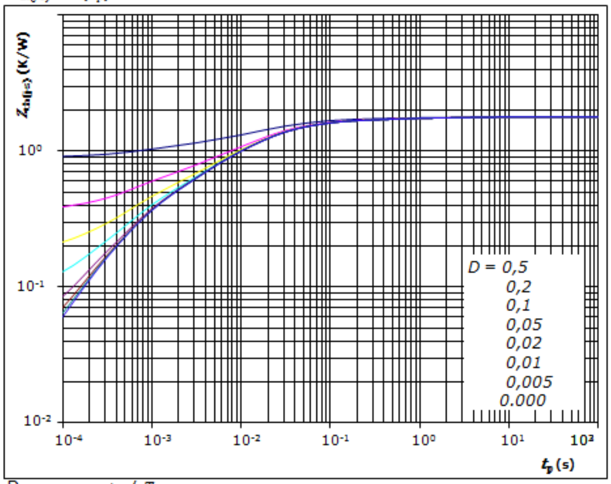


t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



D = t_p / T

$R_{th(j-s)}$ = 1,79 K/W

FWD thermal model values

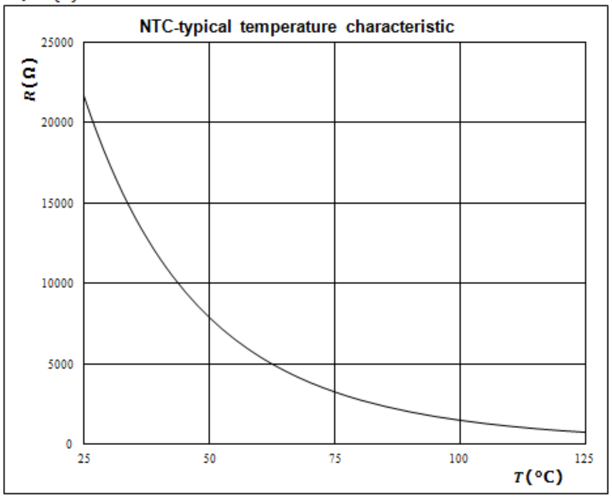
R (K/W)	τ (s)
5,84E-02	2,95E+00
1,15E-01	2,82E-01
4,08E-01	4,27E-02
6,64E-01	1,23E-02
2,86E-01	2,87E-03
2,62E-01	5,46E-04

NTC Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

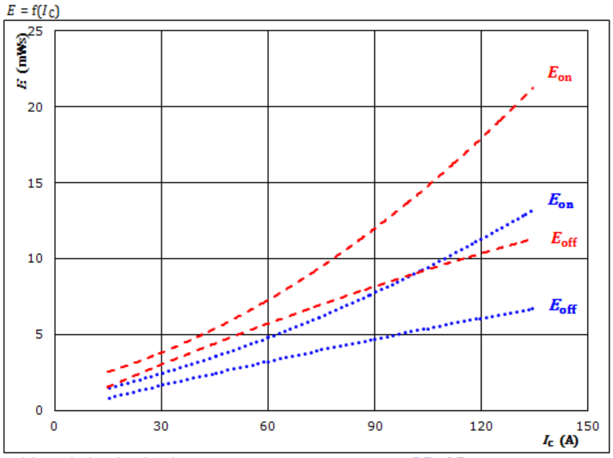


Inverter Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



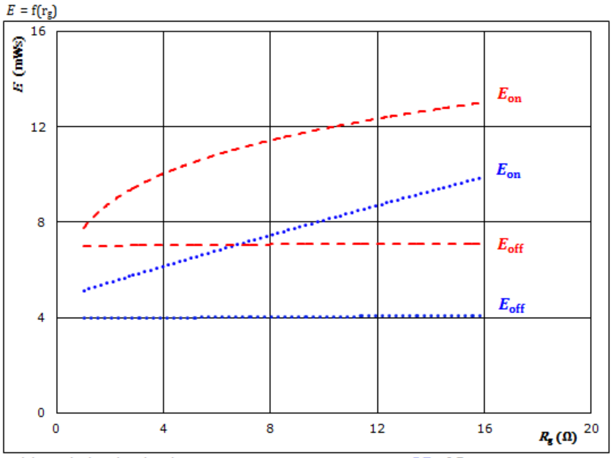
With an inductive load at

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

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



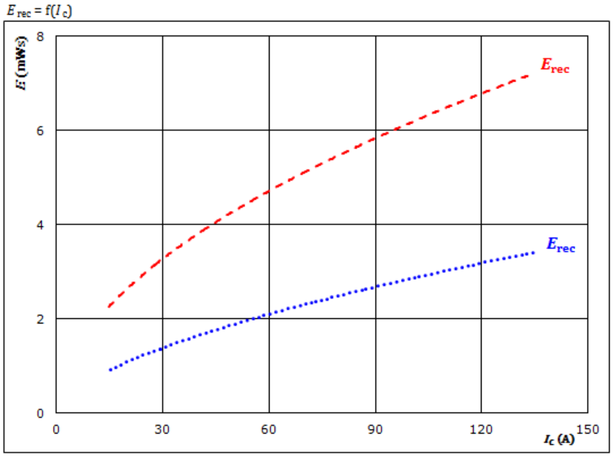
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – –

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



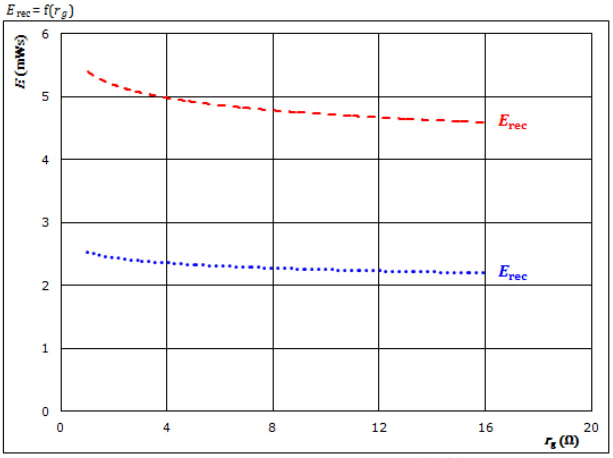
With an inductive load at

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

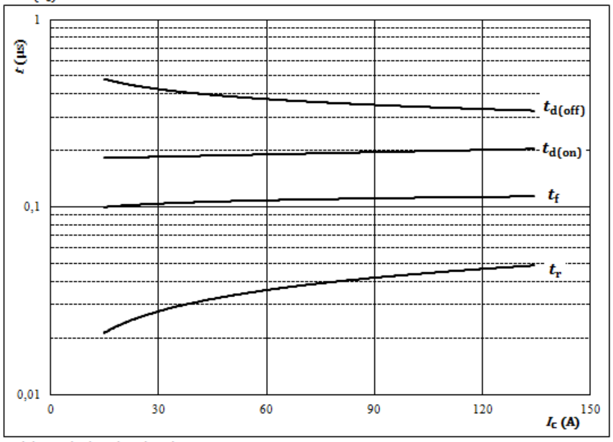
V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – –

Inverter Switching Characteristics

Figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



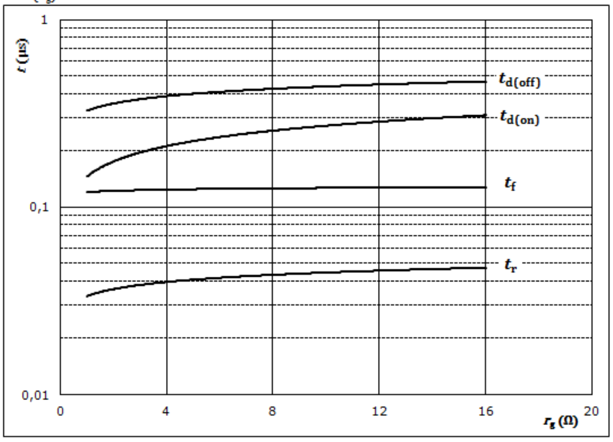
With an inductive load at

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

$t = f(r_g)$



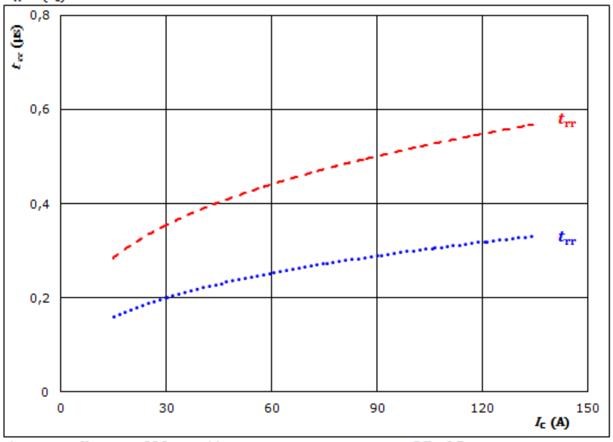
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	75	A

Figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

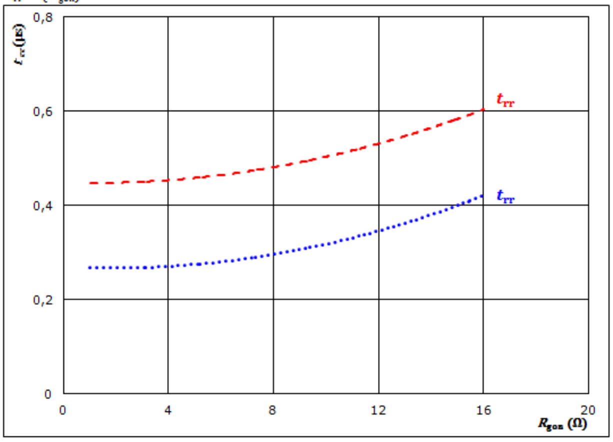


At					
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

Figure 8. FWD

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

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



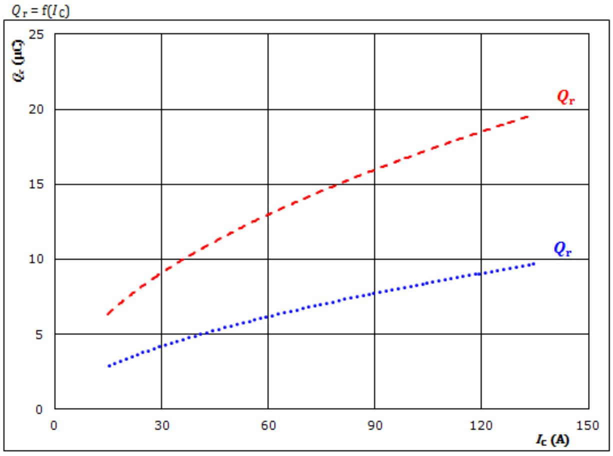
At					
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	75	A		150 °C	– – – –

Inverter Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

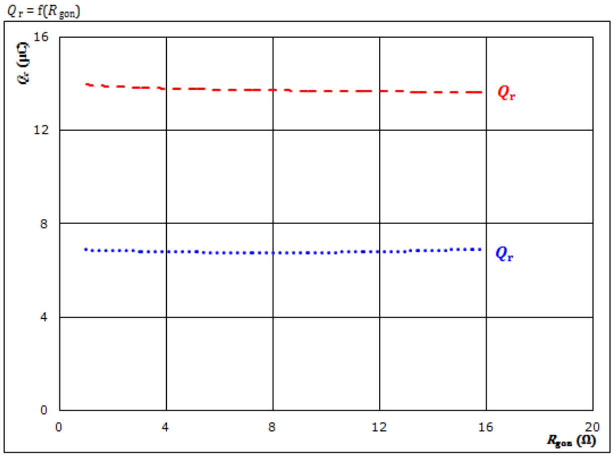


At						
	V_{CE} =	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	R_{gon} =	4	Ω		150 °C	dashed

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

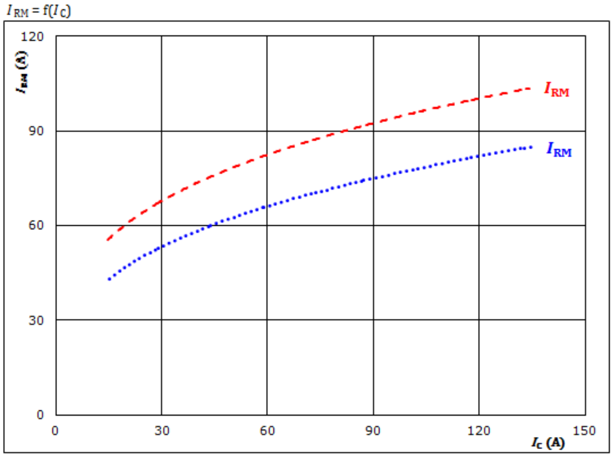


At						
	V_{CE}=	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	I_C=	75	A		150 °C	dashed

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

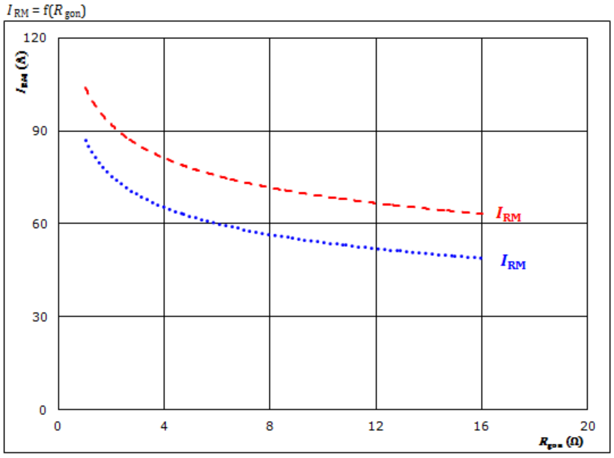


At						
	V_{CE}	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	R_{gon} =	4	Ω		150 °C	dashed

Figure 12. **FWD**

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

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



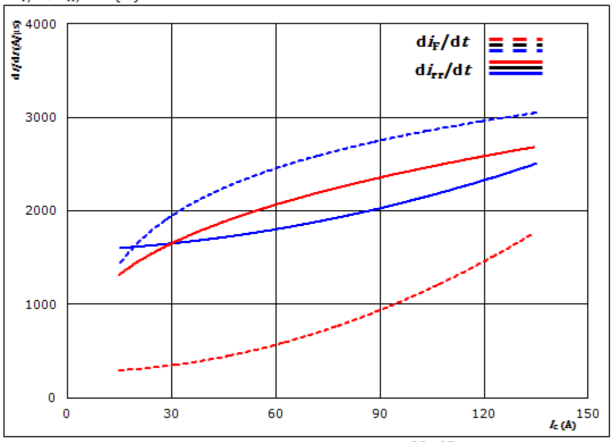
At						
	V_{CE} =	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	I_C=	75	A		150 °C	dashed

Inverter Switching Characteristics

Figure 13. FWD

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

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

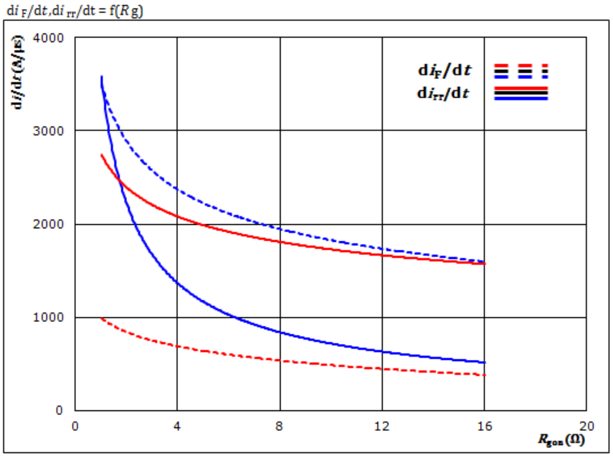


At						
V_{CE} =	600	V		25	°C	············
V_{GE} =	±15	V	T_j:	125	°C	———
R_{gon} =	4	Ω		150	°C	– – –

Figure 14. FWD

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

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

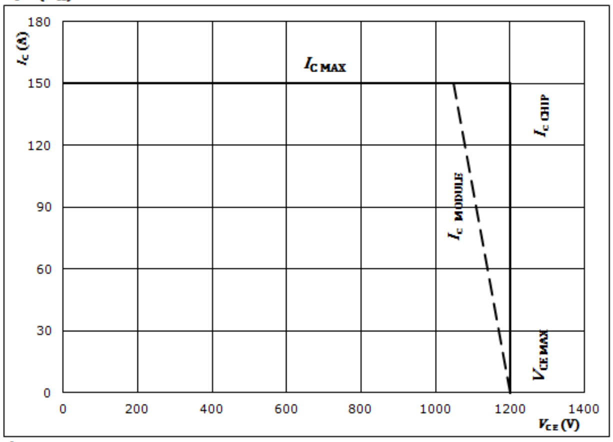


At		
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	75	A

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

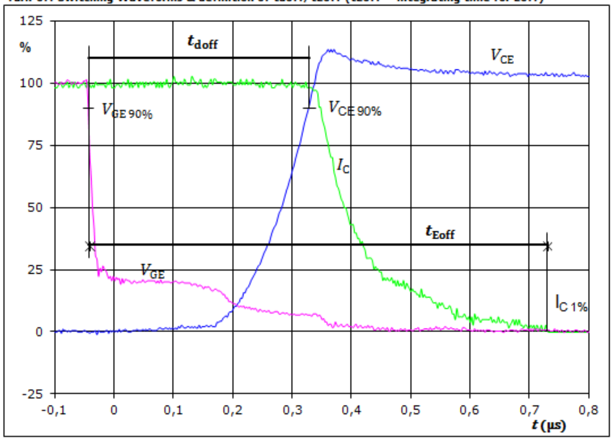
Inverter Switching Definitions

General conditions

T_j	=	150 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

Figure 1. **IGBT**

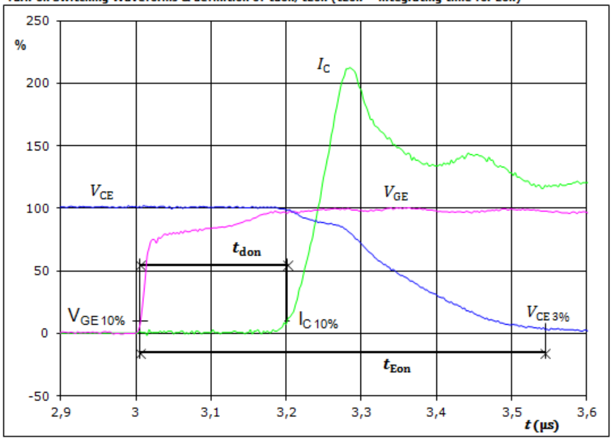
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	75	A
t_{doff} =	0,373	µs
t_{Eoff} =	0,772	µs

Figure 2. **IGBT**

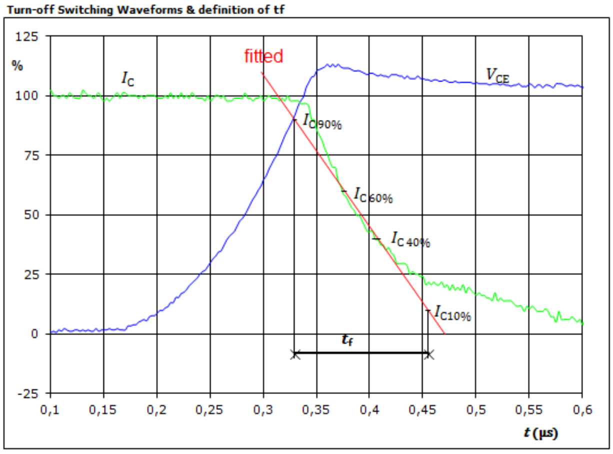
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	75	A
t_{don} =	0,195	µs
t_{Eon} =	0,539	µs

Figure 3. **IGBT**

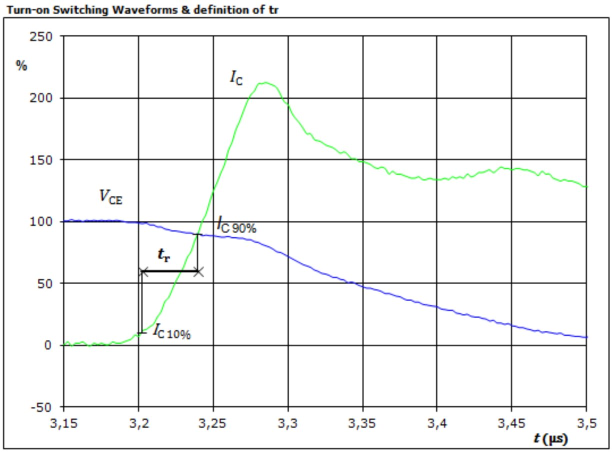
Turn-off Switching Waveforms & definition of tf



V_C (100%) =	600	V
I_C (100%) =	75	A
t_f =	0,120	µs

Figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

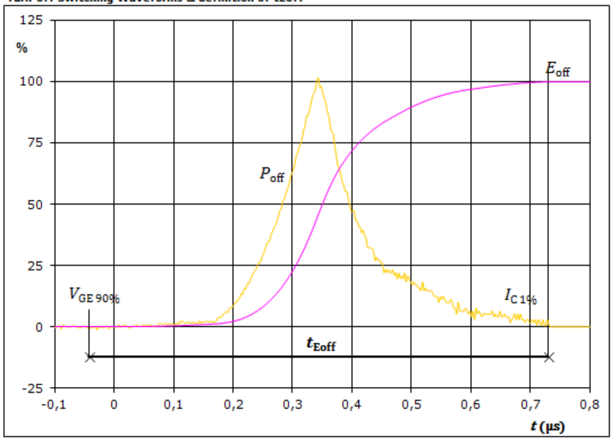


V_C (100%) =	600	V
I_C (100%) =	75	A
t_r =	0,038	µs

Inverter Switching Definitions

Figure 5. **IGBT**

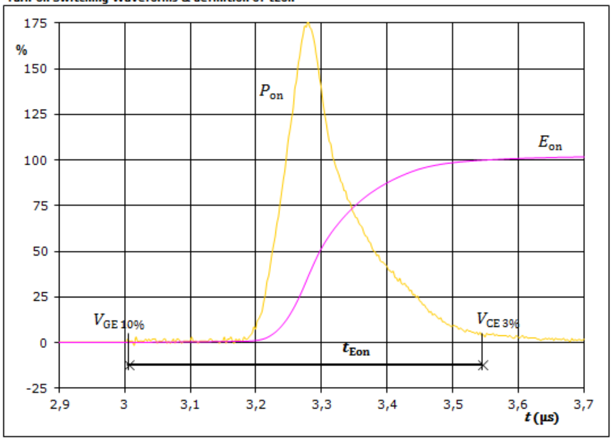
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	44,97	kW
E_{off} (100%) =	7,03	mJ
t_{Eoff} =	0,77	µs

Figure 6. **IGBT**

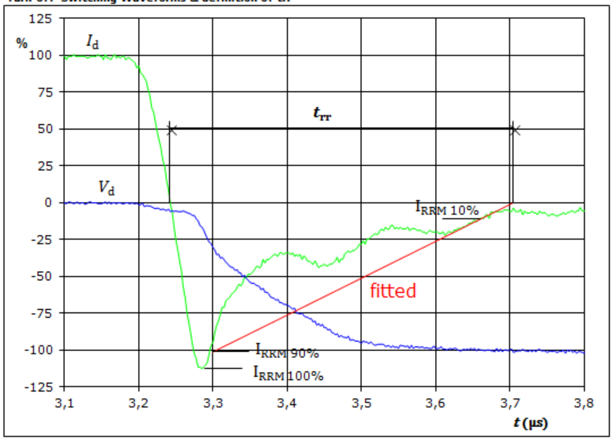
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	44,97	kW
E_{on} (100%) =	9,36	mJ
t_{Eon} =	0,54	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

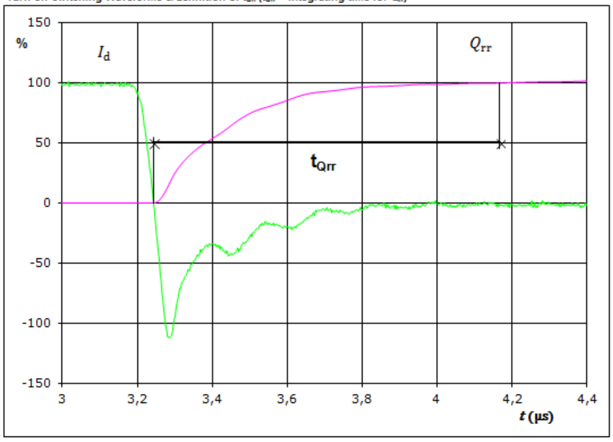


V_d (100%) =	600	V
I_d (100%) =	75	A
I_{RRM} (100%) =	-85	A
t_{rr} =	0,455	µs

Inverter Switching Definitions

Figure 8. **FWD**

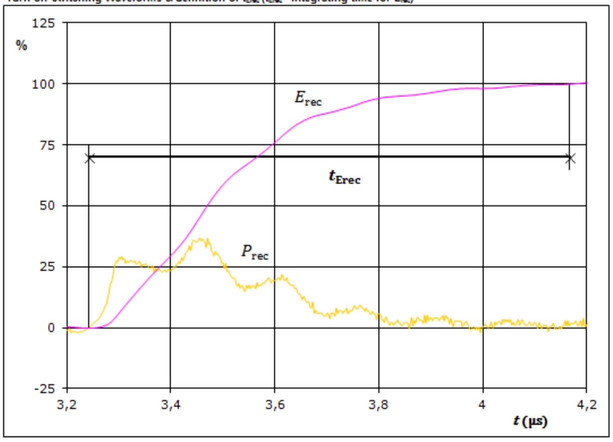
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	75	A
Q_{rr} (100%) =	13,41	µC
t_{Qrr} =	0,93	µs

Figure 9. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec}= integrating time for E_{rec})



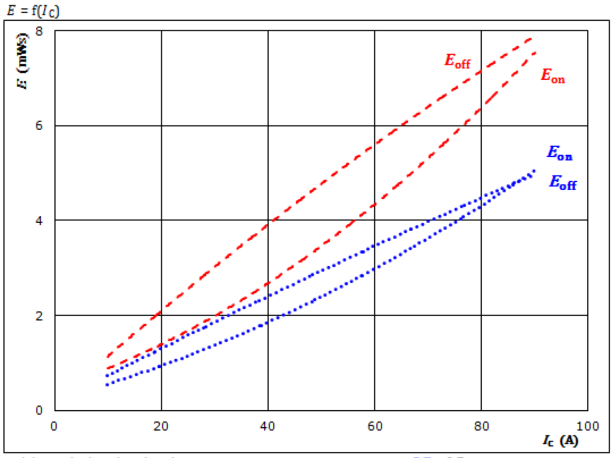
P_{rec} (100%) =	44,97	kW
E_{rec} (100%) =	4,88	mJ
t_{Erec} =	0,93	µs

Brake Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



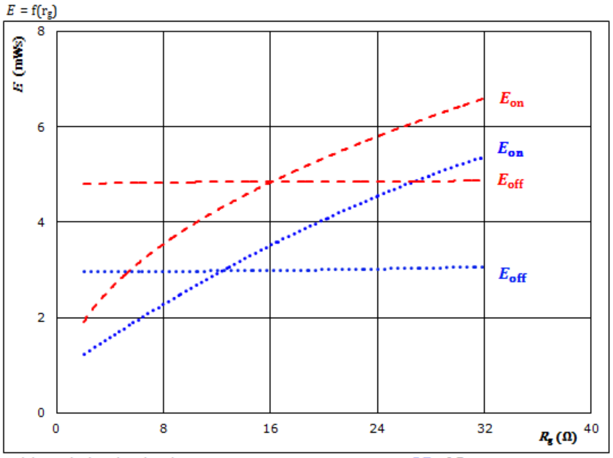
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	8	Ω		150 °C	dashed
R_{goff} =	8	Ω			

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



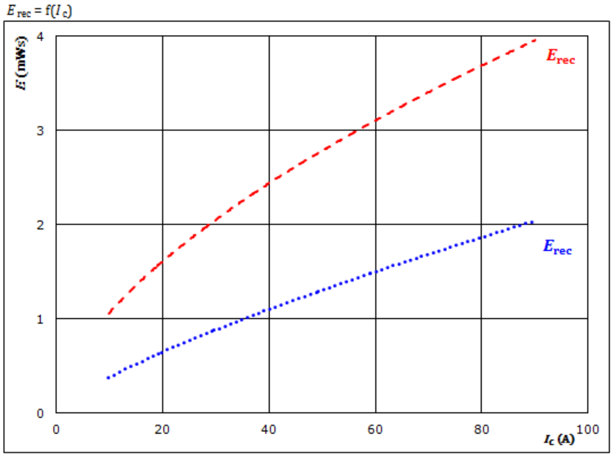
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	50	A		150 °C	dashed

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



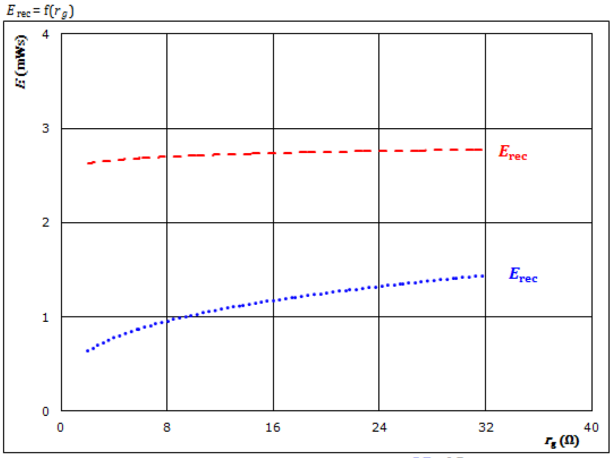
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	8	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

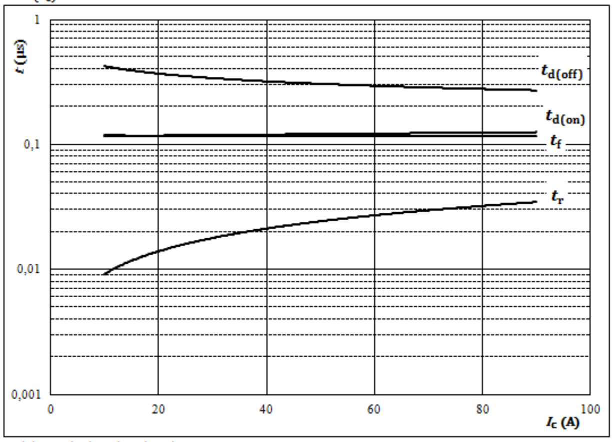
V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	50	A		150 °C	dashed

Brake Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



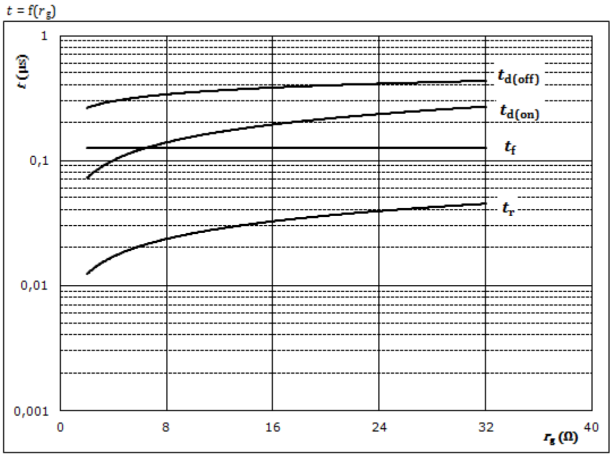
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



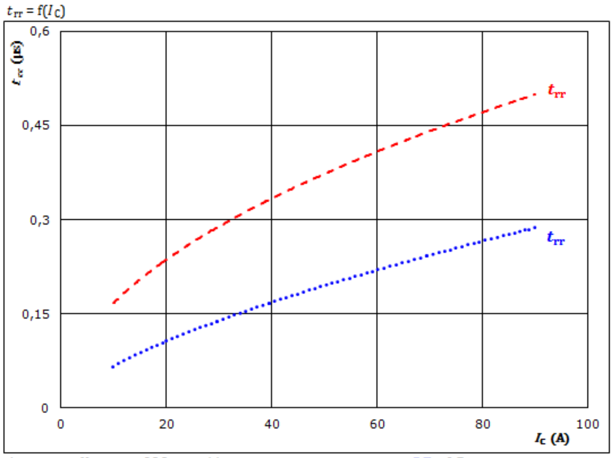
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	50	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

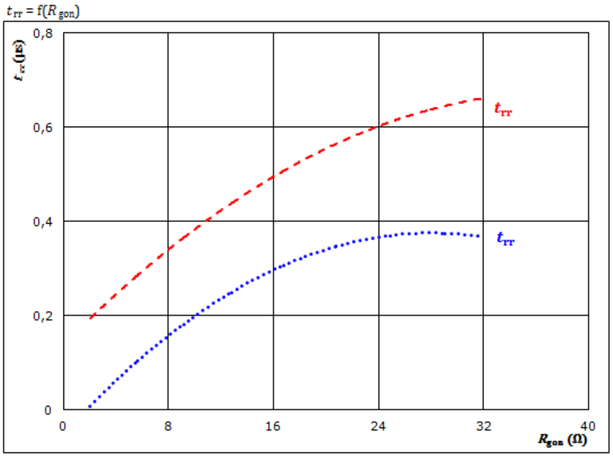


At	V_{CE} =	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	8	Ω		150 °C	– – –

Figure 8. **FWD**

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

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



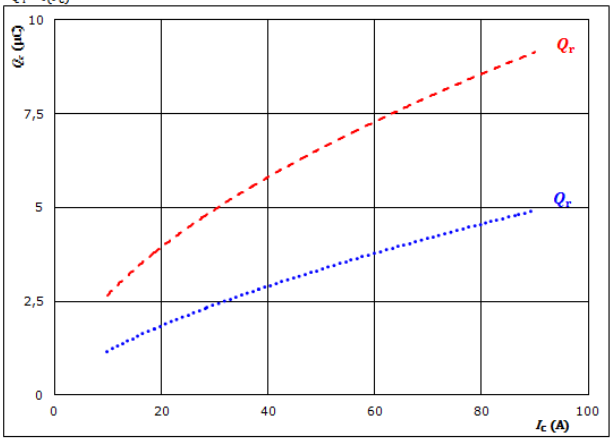
At	V_{CE} =	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C =	50	A		150 °C	– – –

Brake Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

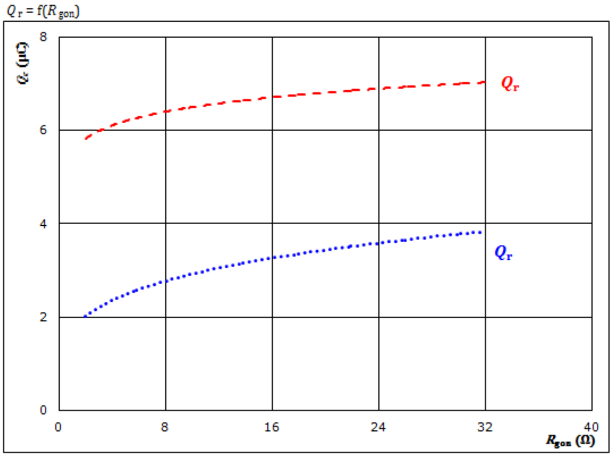


At						
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

Figure 10. FWD

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

$Q_r = f(R_{gon})$

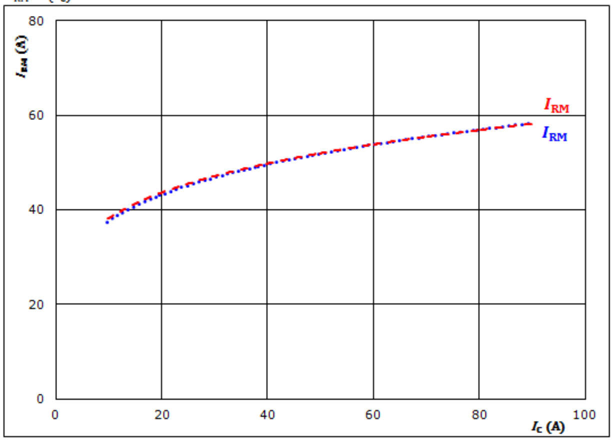


At						
V_{CE}=	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	50	A		150 °C	– – –

Figure 11. FWD

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

$I_{RM} = f(I_C)$

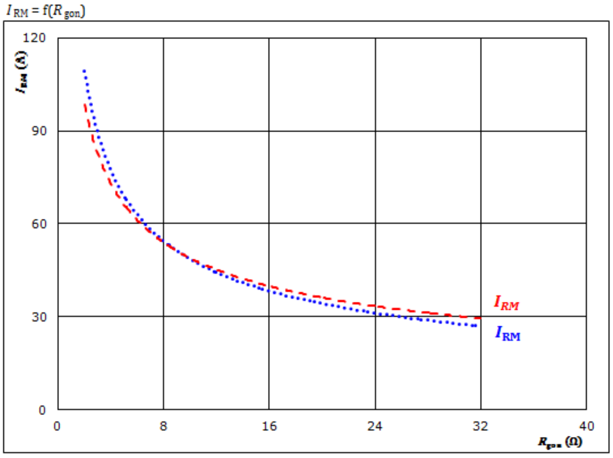


At						
V_{CE}	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

Figure 12. FWD

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

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



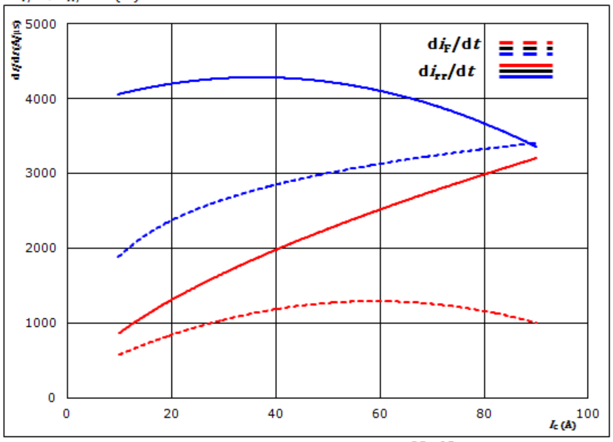
At						
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	50	A		150 °C	– – –

Brake Switching Characteristics

Figure 13. **FWD**

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

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

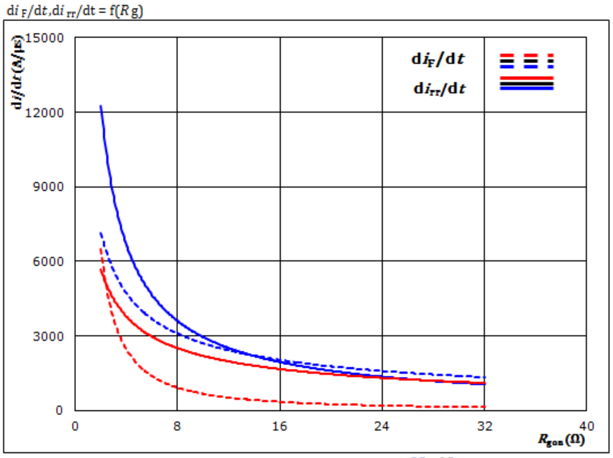


At						
	V_{CE} =	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	R_{gon} =	8	Ω		150 °C	dashed

Figure 14. **FWD**

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

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

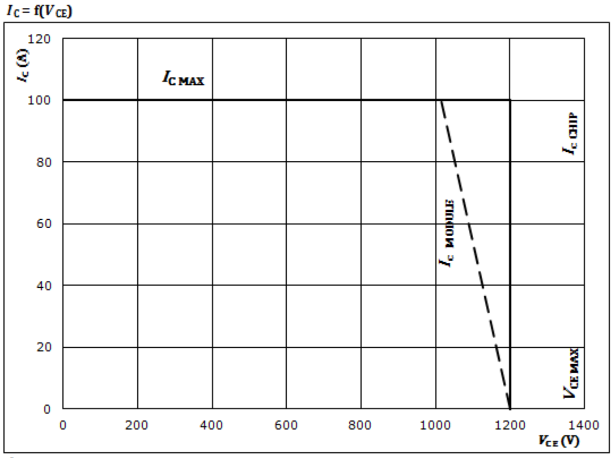


At						
	V_{CE} =	600	V		25 °C	dotted
	V_{GE} =	±15	V	T_j:	125 °C	solid
	I_C =	50	A		150 °C	dashed

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At			
	T_j =	175	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

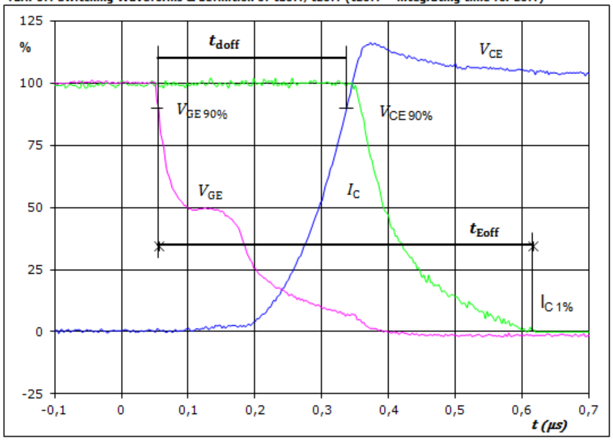
Brake Switching Definitions

General conditions

T_j	=	150 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

Figure 1. IGBT

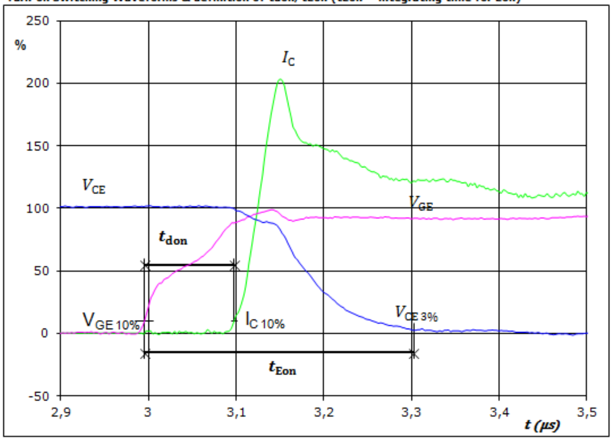
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	50	A
t_{doff} =	0,284	µs
t_{Eoff} =	0,560	µs

Figure 2. IGBT

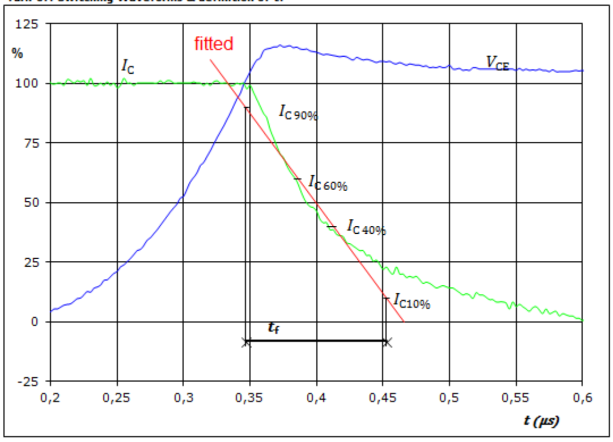
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	50	A
t_{don} =	0,103	µs
t_{Eon} =	0,307	µs

Figure 3. IGBT

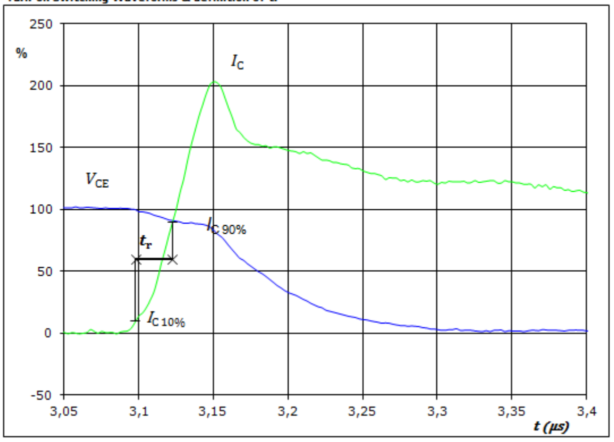
Turn-off Switching Waveforms & definition of tf



V_C(100%) =	600	V
I_C(100%) =	50	A
t_f =	0,112	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

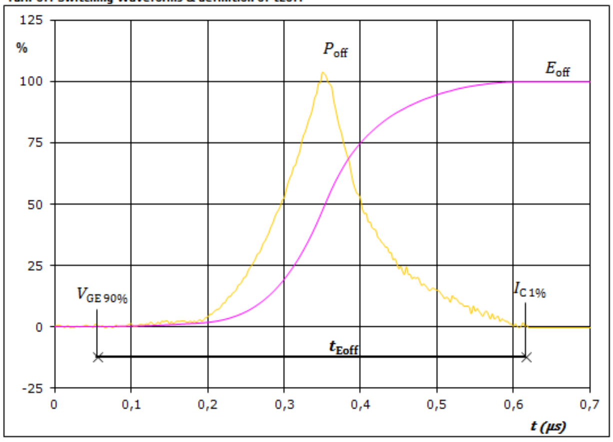


V_C(100%) =	600	V
I_C(100%) =	50	A
t_r =	0,025	µs

Brake Switching Definitions

Figure 5. **IGBT**

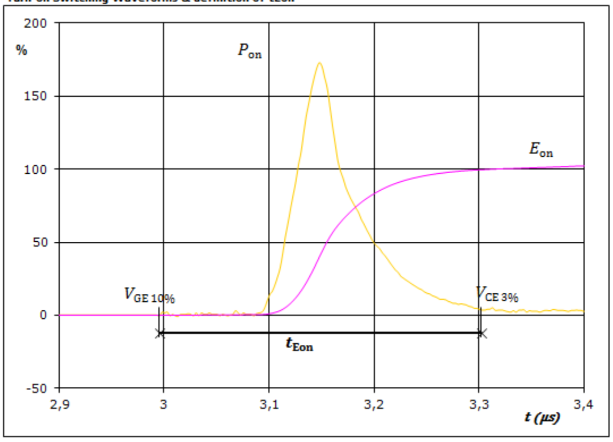
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	30,02	kW
E_{off} (100%) =	4,23	mJ
t_{Eoff} =	0,56	µs

Figure 6. **IGBT**

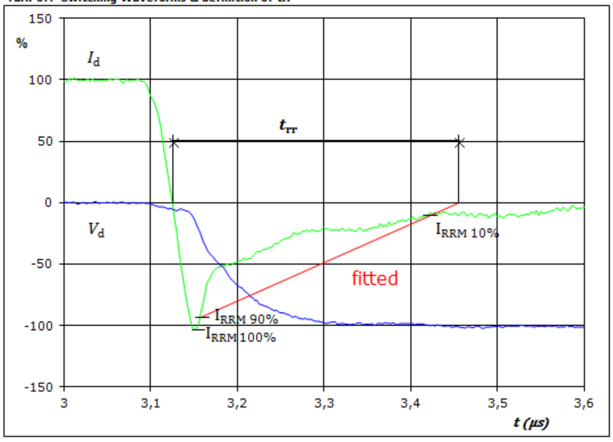
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	30,02	kW
E_{on} (100%) =	3,46	mJ
t_{Eon} =	0,31	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

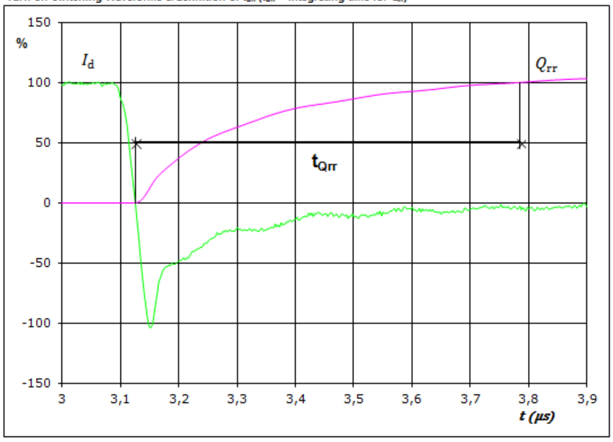


V_d (100%) =	600	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-52	A
t_{rr} =	0,328	µs

Brake Switching Definitions

Figure 8. **FWD**

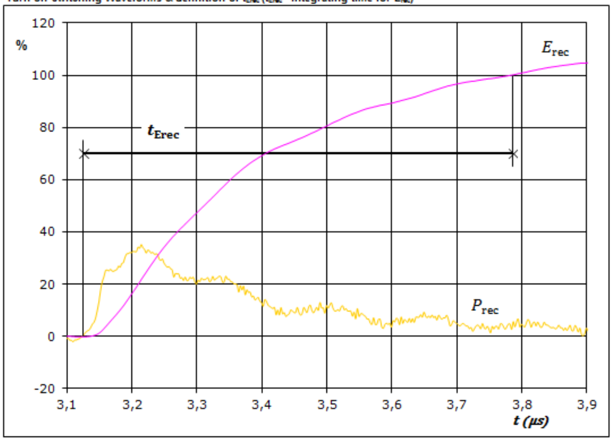
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	50	A
Q_{rr} (100%) =	6,30	µC
t_{Qrr} =	0,66	µs

Figure 9. **FWD**

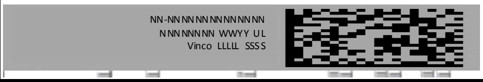
Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	30,02	kW
E_{rec} (100%) =	2,66	mJ
t_{Erec} =	0,66	µs

Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	30-F2127PA075SC-L178E09	L178E09	L178E09



Text	Name		Date code	UL & Vinco	Lot	Serial
	NN-NNNNNNNNNNNNNN-NNNNNNNN		WWYY	UL Vinco	LLLLL	SSSS
Datamatrix	Type	Lot number	Serial	Date code		
	TTTT-TTT	LLLLL	SSSS	WWYY		

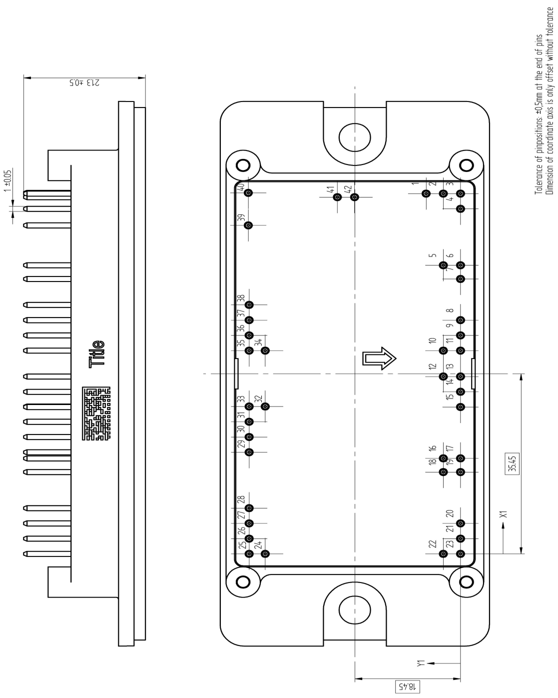
Outline

Pin table [mm]

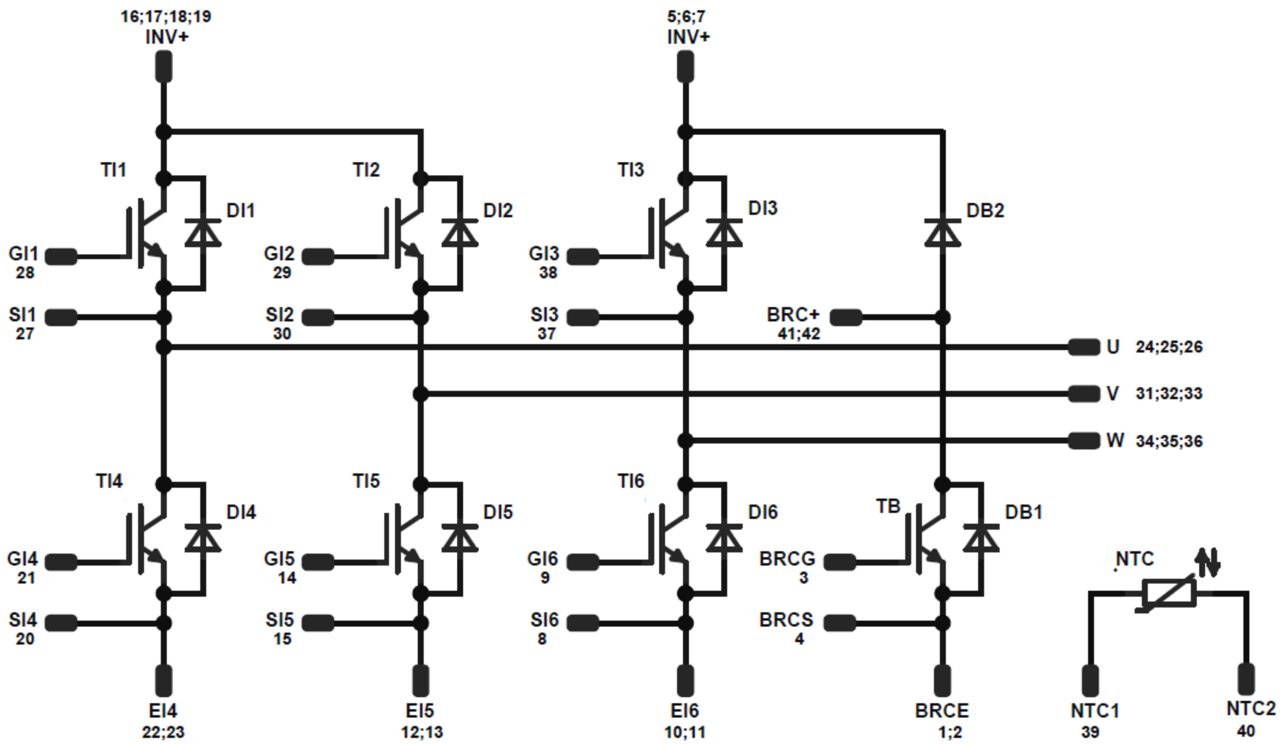
Pin	X	Y	Function
1	70,9	6	BRCE
2	70,9	3	BRCE
3	70,9	0	BRCG
4	67,9	0	BRCS
5	56,8	3	INV+
6	56,8	0	INV+
7	54,1	0	INV+
8	46	0	SI6
9	43	0	GI6
10	40	3	EI6
11	40	0	EI6
12	34,9	3	EI5
13	34,9	0	EI5
14	31,9	0	GI5
15	28,9	0	SI5
16	18,8	3	INV+
17	18,8	0	INV+
18	16,1	3	INV+
19	16,1	0	INV+
20	6	0	SI4
21	3	0	GI4
22	0	3	EI4
23	0	0	EI4
24	0	34,1	U
25	0	36,9	U
26	3	36,9	U
27	6	36,9	SI1
28	9	36,9	GI1
29	20	36,9	GI2

Pin table [mm]

Pin	X	Y	Function
30	23	36,9	SI2
31	26	36,9	V
32	29	36,9	V
33	29	34,1	V
34	40	34,1	W
35	40	36,9	W
36	43	36,9	W
37	46	36,9	SI3
38	49	36,9	GI3
39	64,65	37,05	NTC1
40	71,05	37,05	NTC2
41	70,2	21,5	BRC+
42	70,2	18,5	BRC+



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
TI1-TI6	IGBT	1200V	75A	Inverter switch	
DI1-DI6	FWD	1200V	75A	Inverter diode	
TB	IGBT	1200V	50A	Brake switch	
DB2	FWD	1200V	25A	Brake diode	
DB1	FWD	1200V	7,5A	Brake inverse diode	
NTC	NTC	-	-	Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	42	>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.

Document No.:	Date:	Modification:	Pages
30-F2127PA075SC-L178E09-D3-14	29 Jul. 2015	Outline draw	28