10-F0127PA025SC-L159E09
10-FZ127PA025SC-L159E08
datasheet

flow 7PACK 0 — 1200 V / 25 A

Features

- Compact Flow 0 housing
- Trench Fieldstop IGBT4 Technology
- Compact and Low Inductance Design
- Built-in NTC

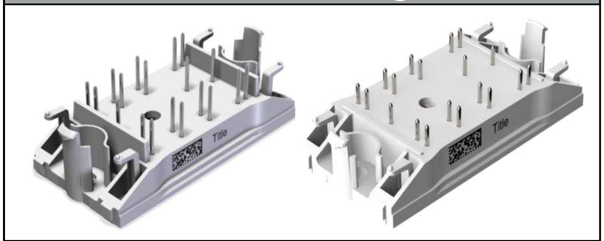
Target applications

- Motor Drives
- Power Generation

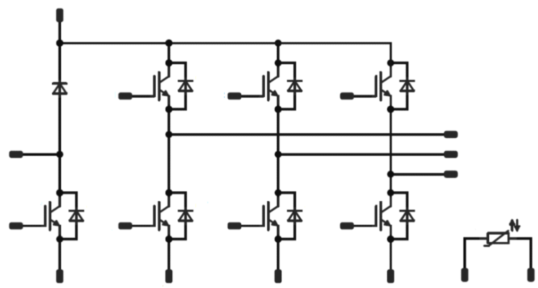
Types

- 10-F0127PA025SC-L159E09
- 10-FZ127PA025SC-L159E08

flow 0 housing



Schematic



Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch\ Brake Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current	I_C	$T_j = T_j$max	T_S=80 °C	33	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_j$max		75	A
Total power dissipation	P_{tot}	$T_j = T_j$max	T_S=80 °C	99	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq$ 125°C V_{GE} = 15V		10 800	µs 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	34	A
Repetitive peak forward current	I_{FRM}			50	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	74	W
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	20	A
Repetitive peak forward current	I_{FRM}			20	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	46	W
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Brake Prot. Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	6	A
Repetitive peak forward current	I_{FRM}			6	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	25	W
Maximum Junction Temperature	T_{jmax}			150	°C

Parameter	Symbol	Conditions		Value	Unit
Module Properties					
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	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,00085	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		25	25 125 150	1,58	1,96 2,22 2,28	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			2,4	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		1450		pF
Reverse transfer capacitance	C_{res}							50		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,96		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	600	25	25 150		66 67		ns
Rise time	t_r					25 150		42 43		
Turn-off delay time	$t_{d(off)}$					25 150		196 264		
Fall time	t_f					25 150		71 138		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,2 µC Q_{rFWD} = 4,5 µC				25 150		2,131 3,149		mWs
Turn-off energy (per pulse)	E_{off}					25 150		1,468 2,483		

Inverter 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
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						1,28		K/W
FWD Switching										
Peak recovery current	I_{RRM}					25 150		13 17		A
Reverse recovery time	t_{rr}					25 150		318 524		ns
Recovered charge	Q_r	di/dt = 565 A/µs di/dt = 465 A/µs	±15	600	25	25 150		2,215 4,501		µC
Reverse recovered energy	E_{rec}					25 150		0,859 1,776		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		115 92		A/µs

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}			0,00085	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		25	25 125 150	1,58	1,96 2,22 2,28	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			2,4	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		1450		pF
Reverse transfer capacitance	C_{res}							50		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,96		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 32 Ω R_{gon} = 32 Ω	±15	600	25	25 125 150		124 123 124		ns
Rise time	t_r					25 125 150		44 46 46		
Turn-off delay time	$t_{d(off)}$					25 125 150		232 289 305		
Fall time	t_f					25 125 150		66 131 151		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 1,4 µC Q_{rFWD} = 2,6 µC Q_{rFWD} = 2,9 µC				25 125 150		2,000 2,488 2,615		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,522 2,373 2,663		

Brake Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				10	25 125 150		1,76 - 1,68	2,05	V
Reverse leakage current	I_r			1200		25 150			2,7 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						2,07		K/W
FWD Switching										
Peak recovery current	I_{RRM}					25 125 150		9 11 12		A
Reverse recovery time	t_{rr}					25 125 150		349 542 576		ns
Recovered charge	Q_r	di/dt = 422 A/µs di/dt = 355 A/µs di/dt = 386 A/µs	±15	600	25	25 125 150		1,424 2,577 2,854		µC
Reverse recovered energy	E_{rec}					25 125 150		0,554 1,069 1,189		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		26 23 23		A/µs

Brake Prot. Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				3	25 125 150		1,65 - 1,51	1,6	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						2,8		K/W

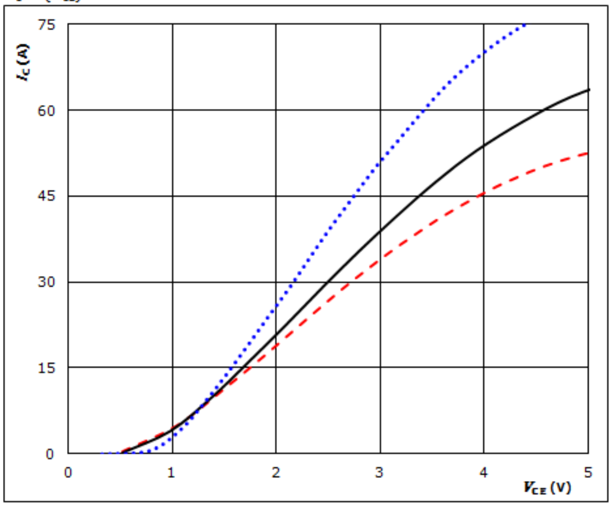
Thermistor

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	ΔR/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\ Brake Switch Characteristics

Typical output characteristics IGBT

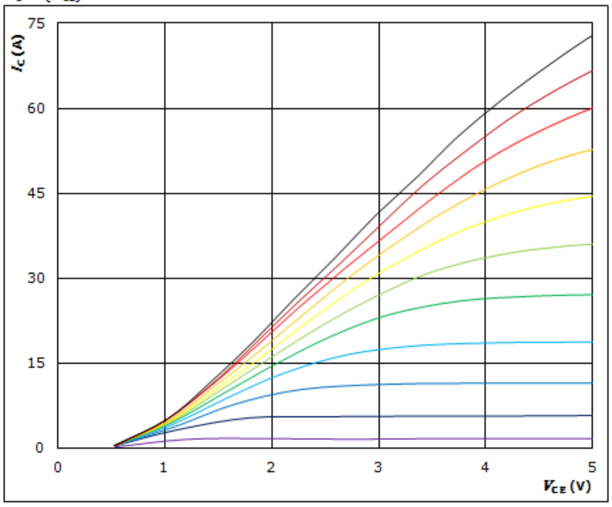
$I_C = f(V_{CE})$



t_p =	250	µs	25 °C	dotted (blue)
V_{GE} =	15	V	125 °C	solid (black)
			150 °C	dashed (red)

Typical output characteristics IGBT

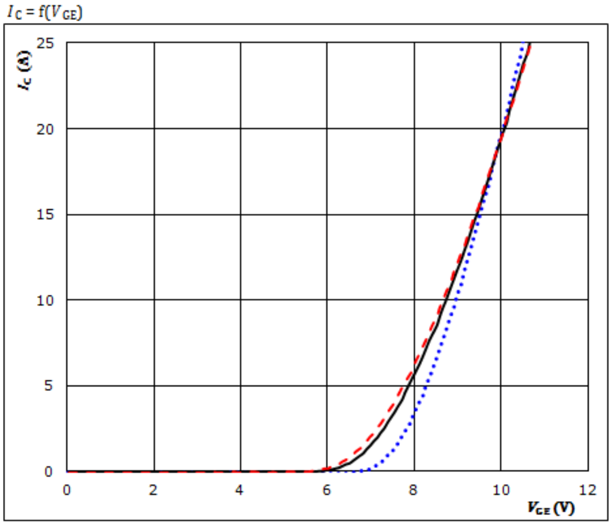
$I_C = f(V_{CE})$



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

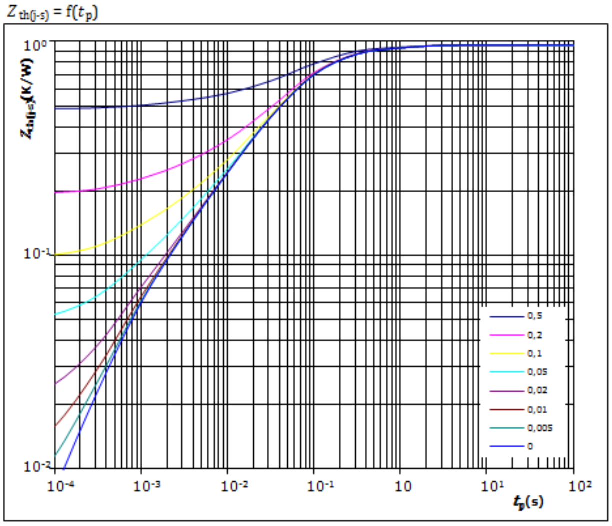
$I_C = f(V_{GE})$



t_p =	100	µs	25 °C	dotted (blue)
V_{CE} =	10	V	125 °C	solid (black)
			150 °C	dashed (red)

Transient Thermal Impedance as function of Pulse duration IGBT

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



D = t_p / T
$R_{th(j-s)}$ = 0,96 K/W

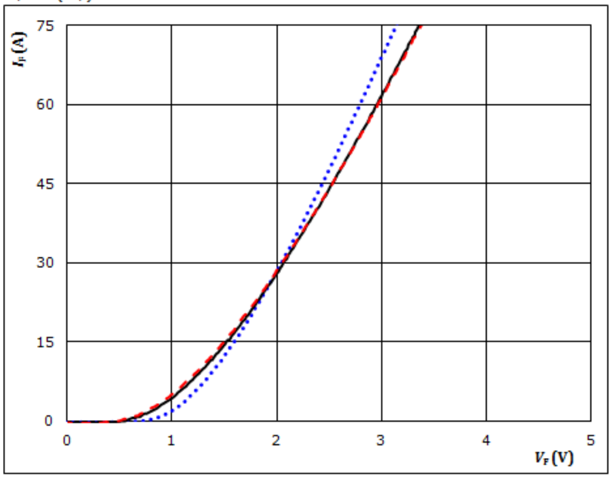
IGBT thermal model values

R_{th} (K/W)	τ (s)
9,34E-02	8,35E-01
3,42E-01	1,19E-01
3,61E-01	4,14E-02
1,15E-01	7,70E-03
5,33E-02	9,80E-04

Inverter Diode Characteristics

Typical forward characteristics FWD

$I_F = f(V_F)$

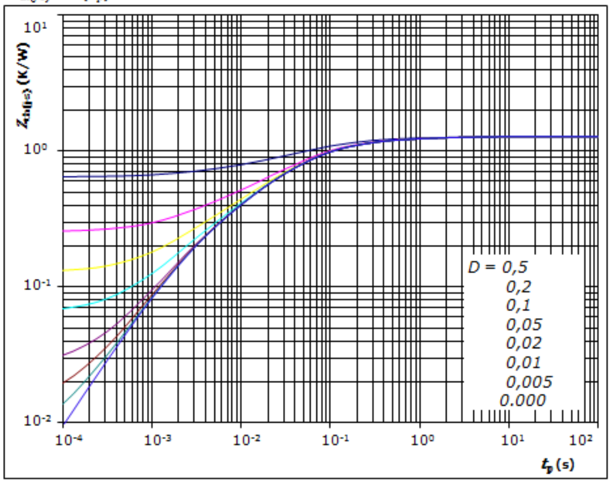


t_p = 250 μs

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

$R_{th(j-s)}$ = 1,28 K/W

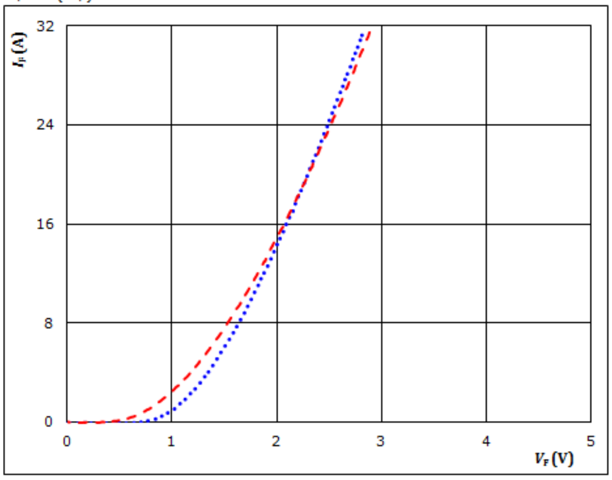
FWD thermal model values

R (K/W)	τ (s)
7,72E-02	1,92E+00
2,31E-01	2,16E-01
5,84E-01	4,89E-02
2,74E-01	1,07E-02
1,17E-01	2,07E-03

Brake Diode Characteristics

Typical forward characteristics	FWD

$I_F = f(V_F)$

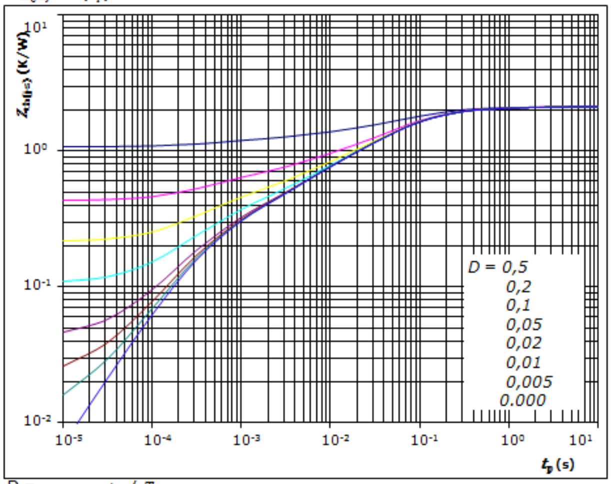


t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width	FWD

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



D = t_p / T

$R_{th(j-s)}$ = 2,15 K/W

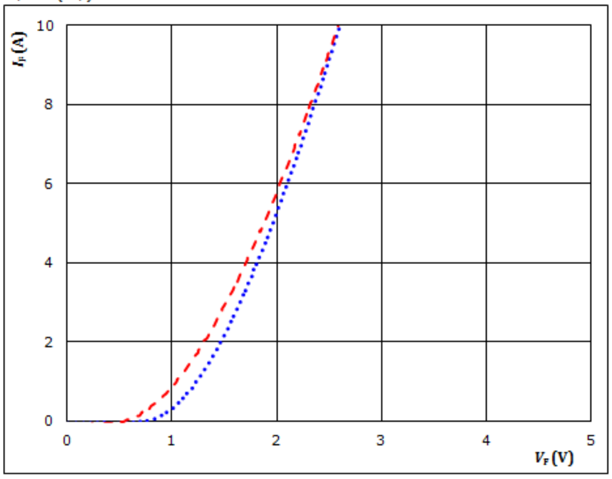
FWD thermal model values

R (K/W)	τ (s)
3,10E-02	7,71E+00
1,09E-01	1,08E+00
3,89E-01	1,75E-01
8,97E-01	5,51E-02
3,66E-01	8,94E-03
1,58E-01	1,84E-03
1,96E-01	3,48E-04

Brake Prot. Diode Characteristics

Typical forward characteristics FWD

$I_F = f(V_F)$

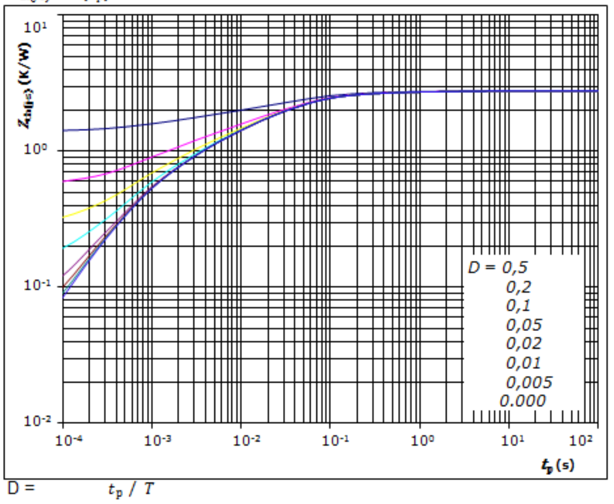


t_p = 250 μs

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

$R_{th(j\text{-}s)}$ = 2,8 K/W

FWD thermal model values

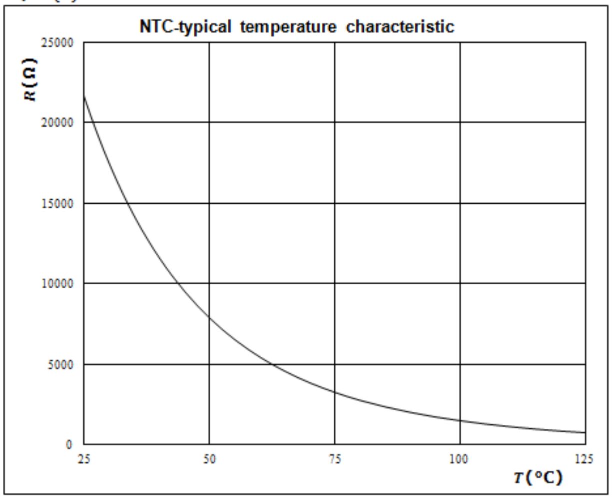
R (K/W)	τ (s)
7,82E-02	2,45E+00
1,95E-01	2,65E-01
9,84E-01	4,77E-02
6,58E-01	1,23E-02
5,09E-01	2,70E-03
3,71E-01	5,98E-04

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic as a function of temperature

$R_T = f(T)$

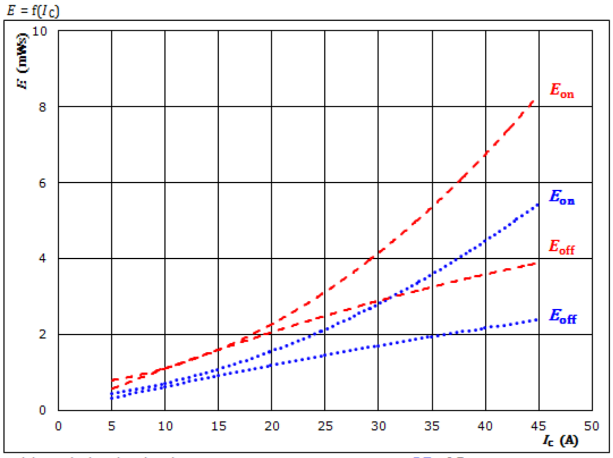


Inverter Switching

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



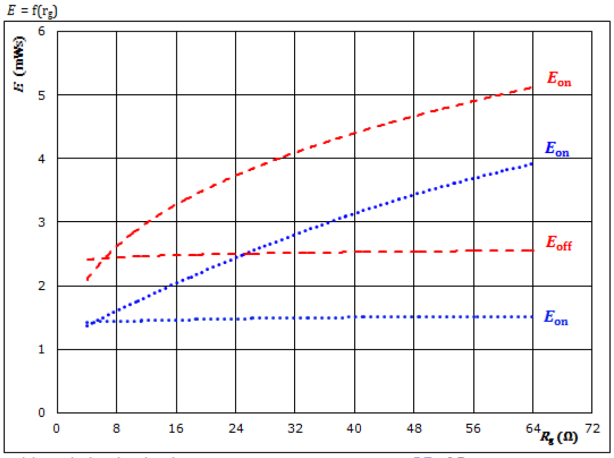
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	16	Ω		150 °C	– – –
R_{goff} =	16	Ω			

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



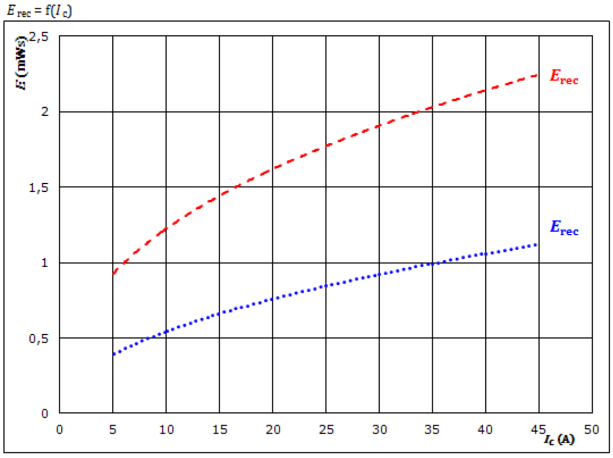
With an inductive load at

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

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



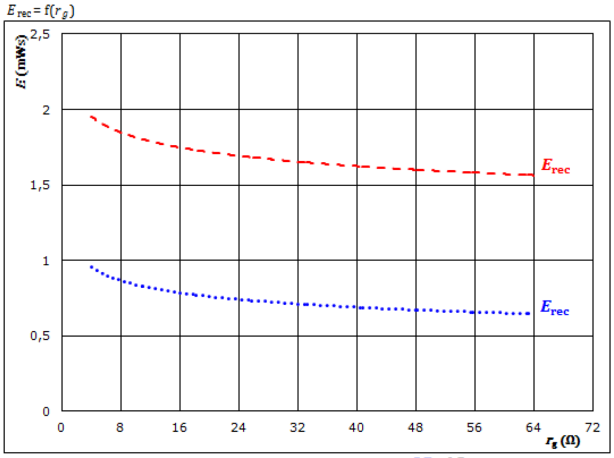
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	16	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

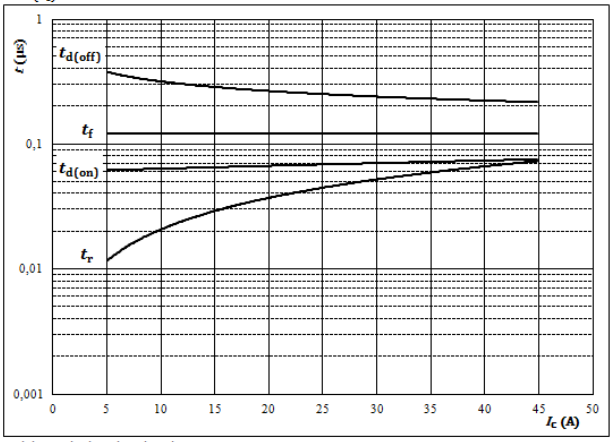
V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	25	A		150 °C	– – –

Inverter Switching

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



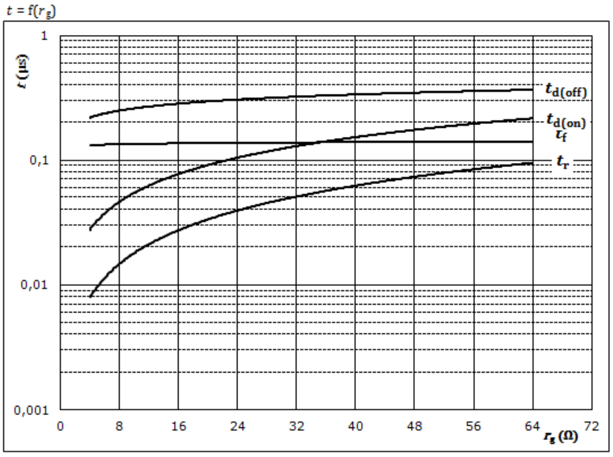
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



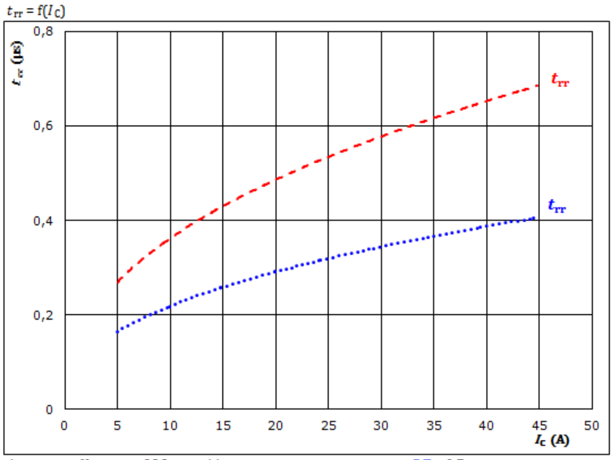
With an inductive load at

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

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

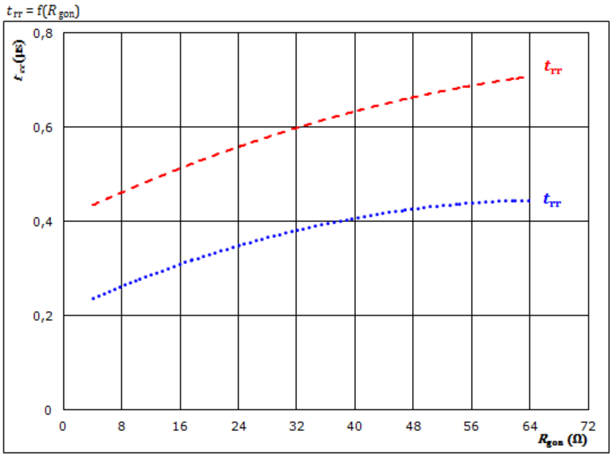


At						
V_{CE} =	600	V			**25 °C**	···········
V_{GE} =	±15	V	T_j:		**125 °C**	———
R_{gon} =	16	Ω			**150 °C**	– – –

Figure 8. **FWD**

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

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



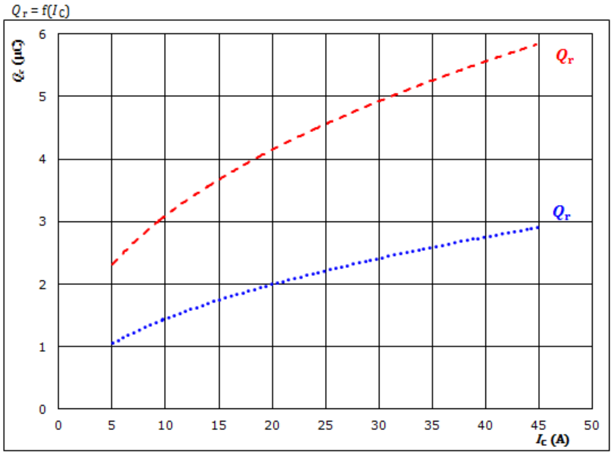
At						
V_{CE} =	600	V			**25 °C**	···········
V_{GE} =	±15	V	T_j:		**125 °C**	———
I_C =	25	A			**150 °C**	– – –

Inverter Switching

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

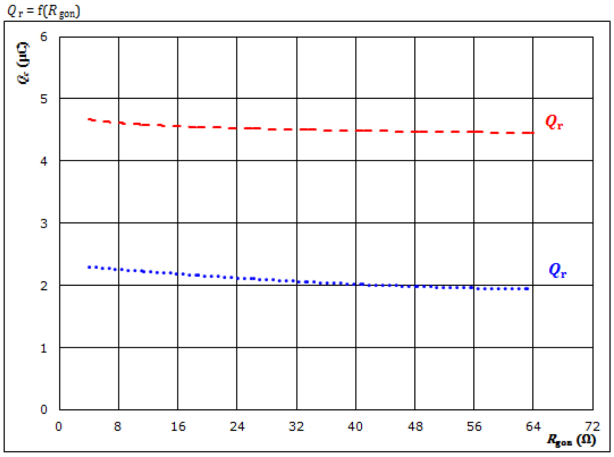


At	V_{CE} =	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	16	Ω		150 °C	– – – –

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

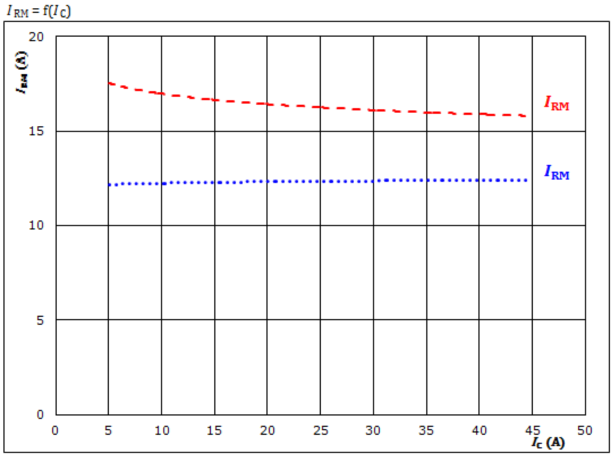


At	V_{CE}=	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	25	A		150 °C	– – – –

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

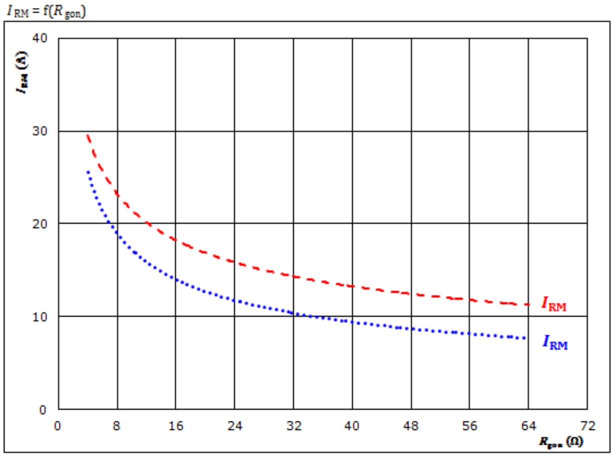


At	V_{CE}	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	16	Ω		150 °C	– – – –

Figure 12. **FWD**

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

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



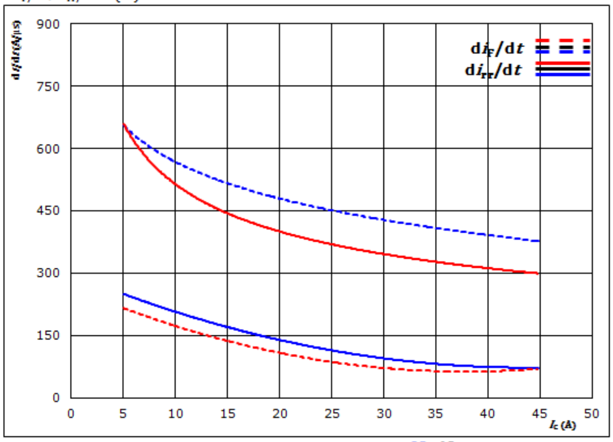
At	V_{CE} =	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	25	A		150 °C	– – – –

Inverter Switching

Figure 13. **FWD**

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

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

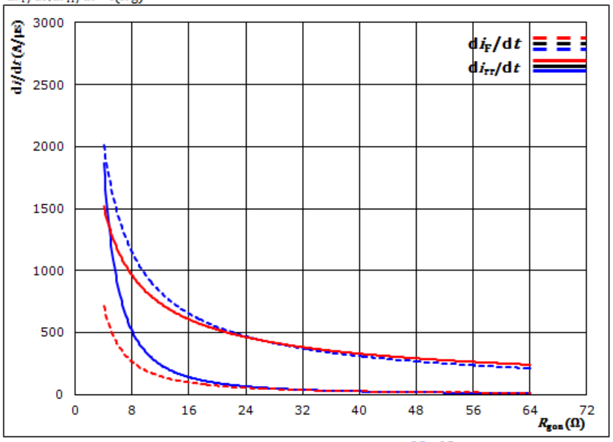


At					
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – –

Figure 14. **FWD**

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

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

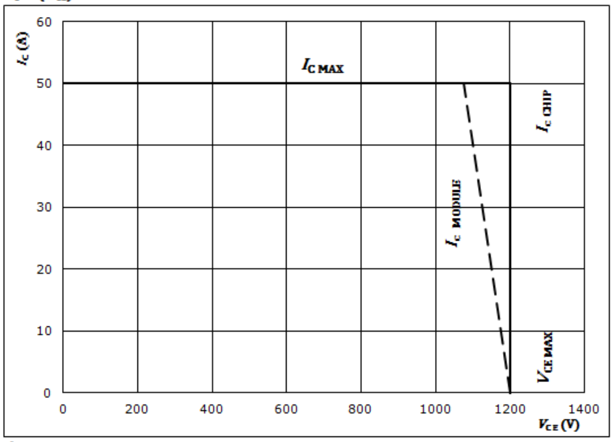


At					
V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	25	A		150 °C	– – –

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	16	Ω
R_{goff} =	16	Ω

Inverter Switching

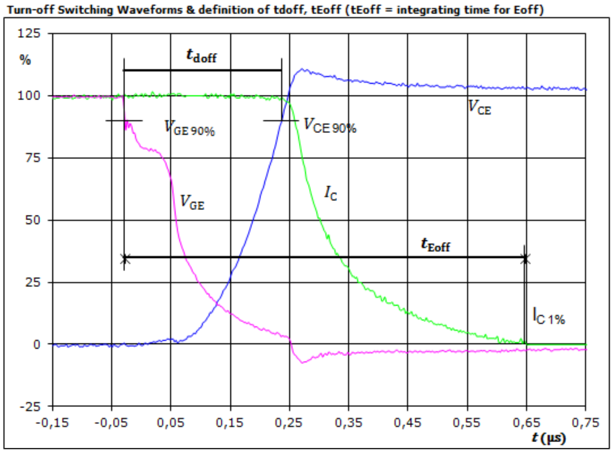
Switching Definitions

General conditions

T_j	=	150 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

Figure 1. **IGBT**

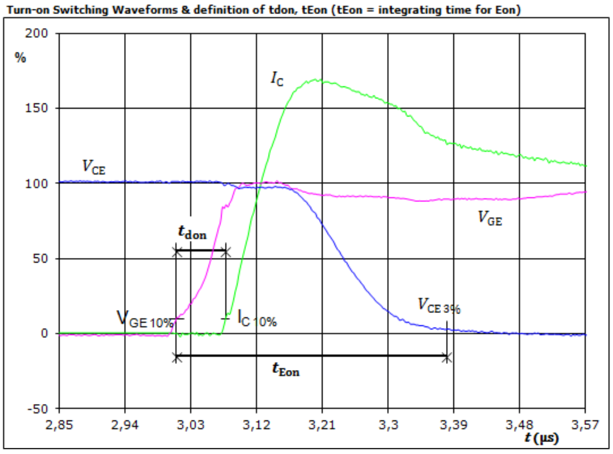
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	25	A
t_{doff} =	0,264	µs
t_{Eoff} =	0,675	µs

Figure 2. **IGBT**

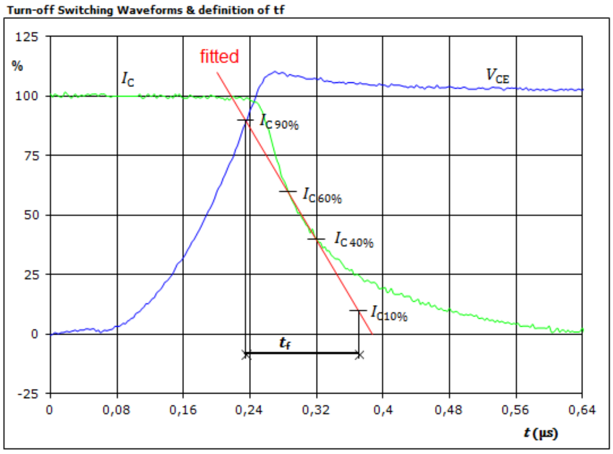
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	25	A
t_{don} =	0,067	µs
t_{Eon} =	0,370	µs

Figure 3. **IGBT**

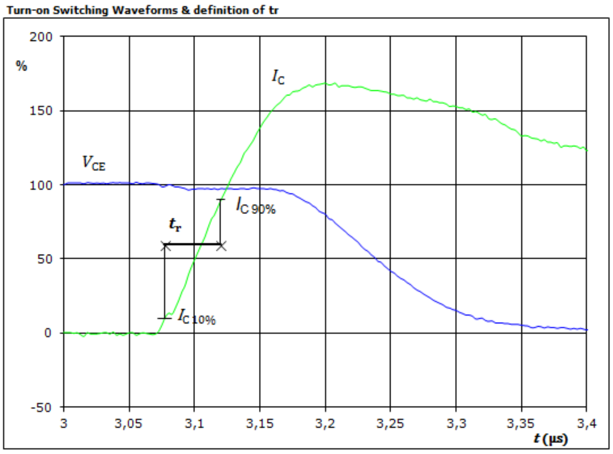
Turn-off Switching Waveforms & definition of tf



V_C(100%) =	600	V
I_C(100%) =	25	A
t_f =	0,138	µs

Figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

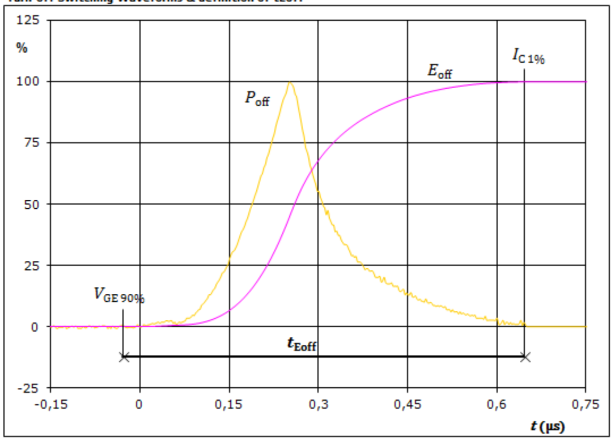


V_C(100%) =	600	V
I_C(100%) =	25	A
t_r =	0,043	µs

Inverter Switching

Figure 5.	**IGBT**

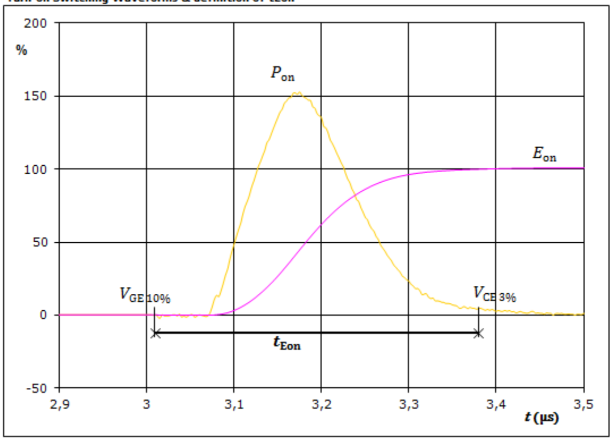
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	15,00	kW
E_{off} (100%) =	2,48	mJ
t_{Eoff} =	0,67	µs

Figure 6.	**IGBT**

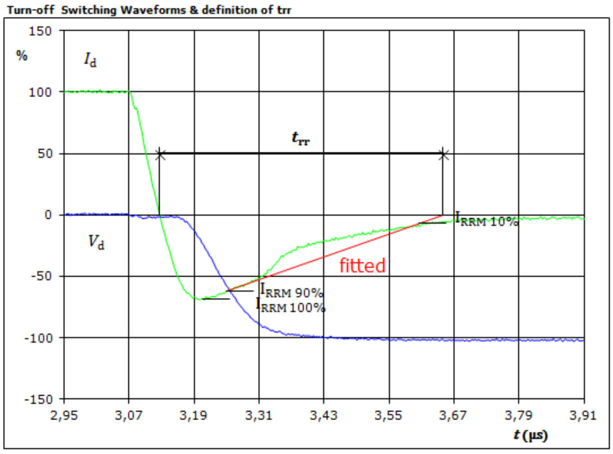
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	15,00	kW
E_{on} (100%) =	3,15	mJ
t_{Eon} =	0,37	µs

Figure 7.	**FWD**

Turn-off Switching Waveforms & definition of trr

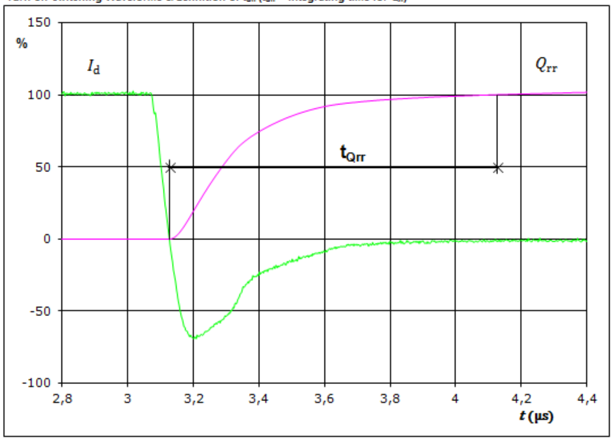


V_d (100%) =	600	V
I_d (100%) =	25	A
I_{RRM} (100%) =	-17	A
t_{rr} =	0,524	µs

Inverter Switching

Figure 8. **FWD**

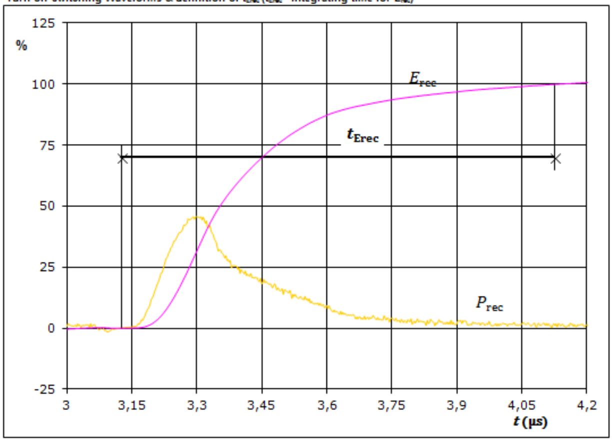
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	25	A
Q_{rr} (100%) =	4,50	µC
t_{Qrr} =	1,00	µs

Figure 9. **FWD**

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



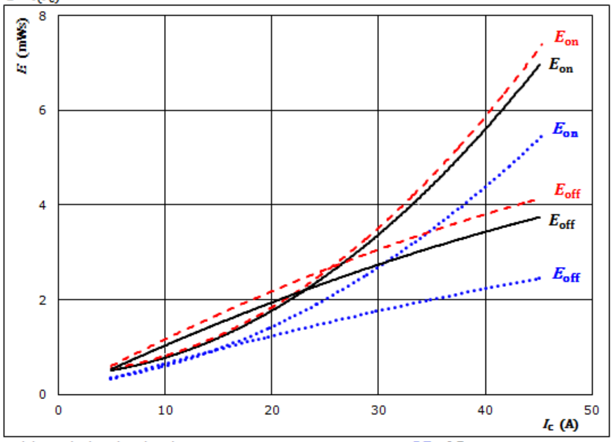
P_{rec} (100%) =	15,00	kW
E_{rec} (100%) =	1,78	mJ
t_{Erec} =	1,00	µs

Brake Switching

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



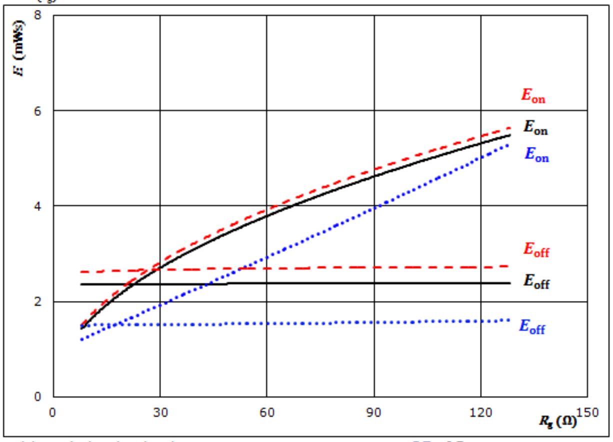
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –
R_{goff} =	32	Ω			

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



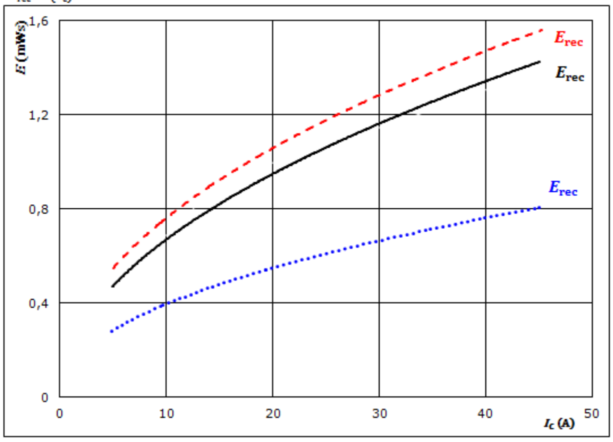
With an inductive load at

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

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



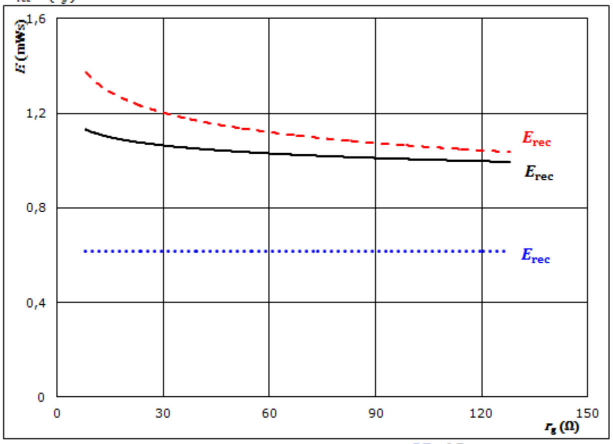
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	32	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

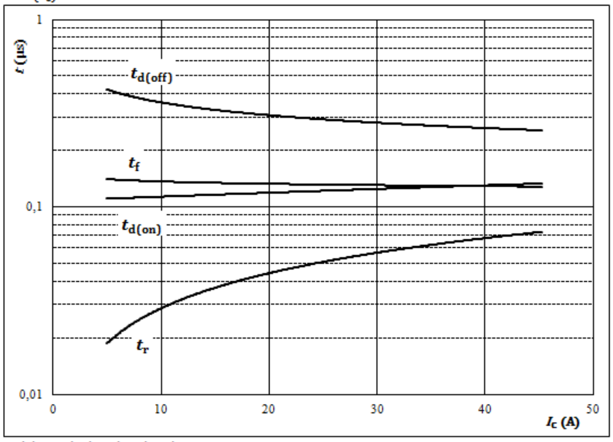
V_{CE} =	600	V	T_j:	25 °C	··········
V_{GE} =	±15	V		125 °C	———
I_C =	25	A		150 °C	– – – –

Brake Switching

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



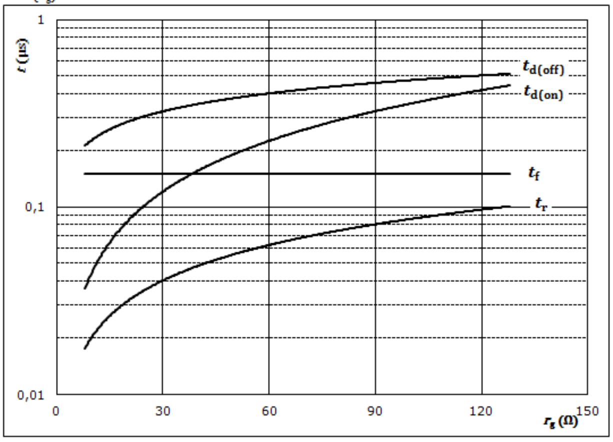
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	32	Ω
R_{goff} =	32	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



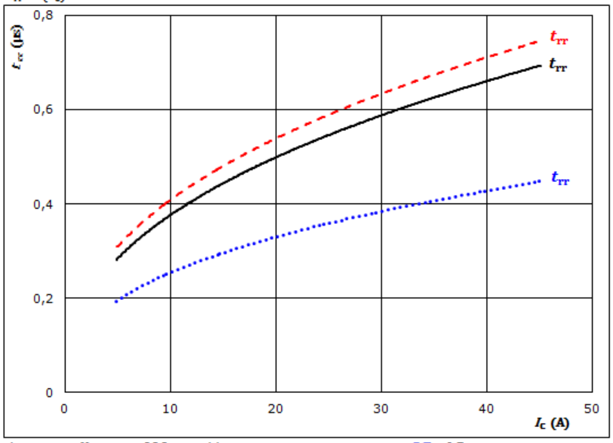
With an inductive load at

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

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

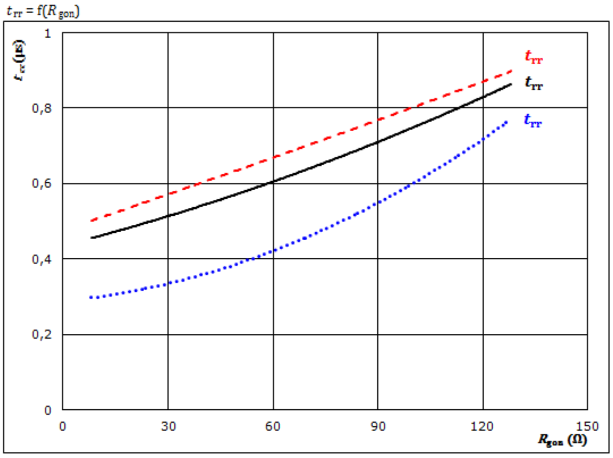


At V_{CE}:	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – –

Figure 8. **FWD**

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

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



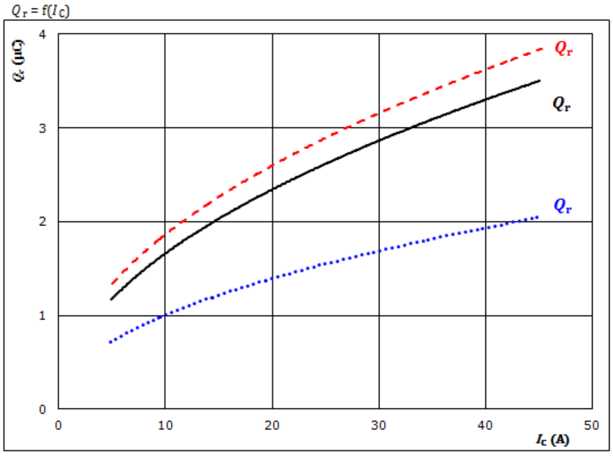
At V_{CE} =	600	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	25	A		150 °C	– – –

Brake Switching

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

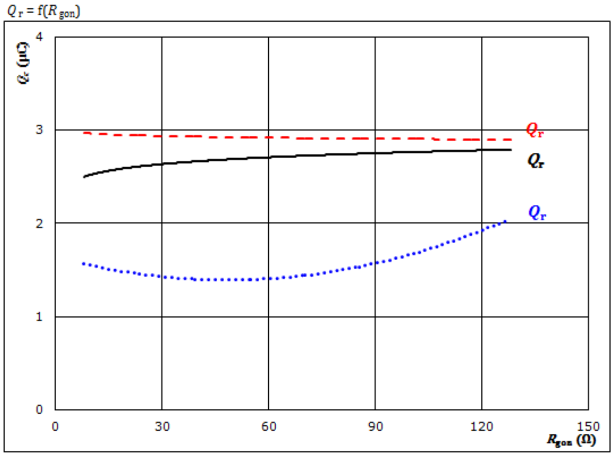


At	V_{CE} =	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	32	Ω		150 °C	– – – –

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

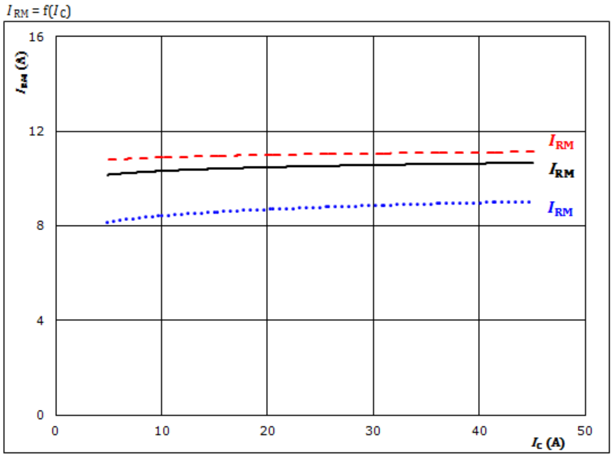


At	V_{CE}=	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	25	A		150 °C	– – – –

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

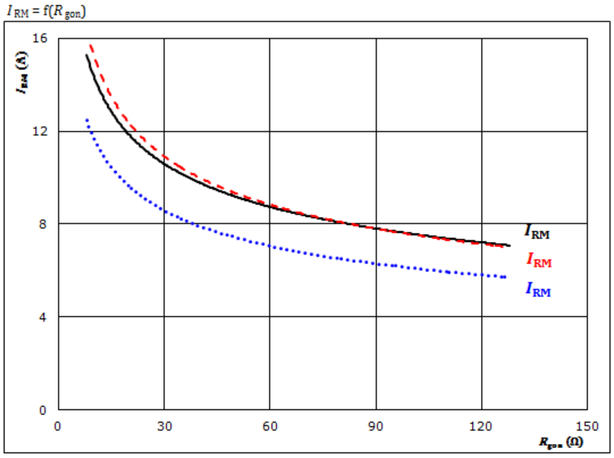


At	V_{CE}	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	32	Ω		150 °C	– – – –

Figure 12. **FWD**

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

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



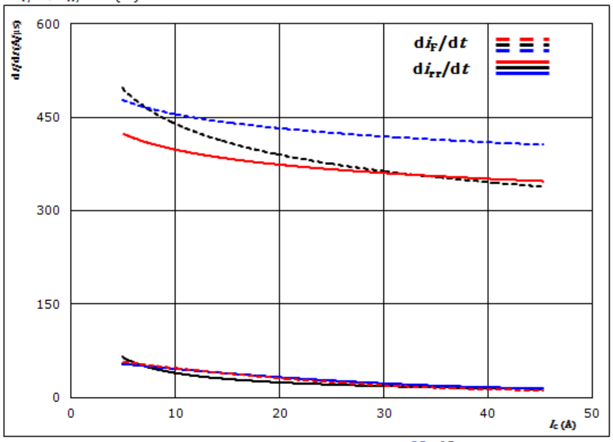
At	V_{CE} =	600	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	25	A		150 °C	– – – –

Brake Switching

Figure 13. **FWD**

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

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

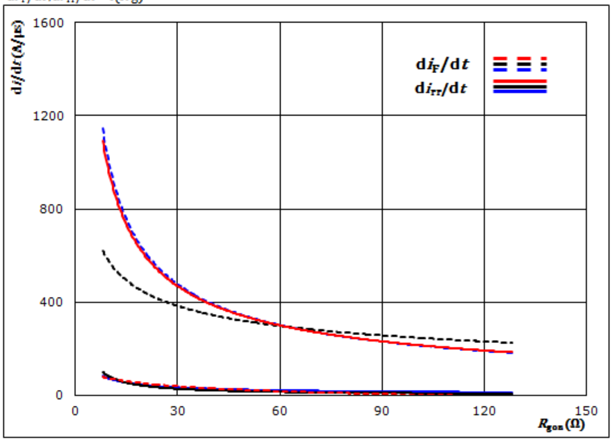


At					
V_{CE}	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 14. **FWD**

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

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

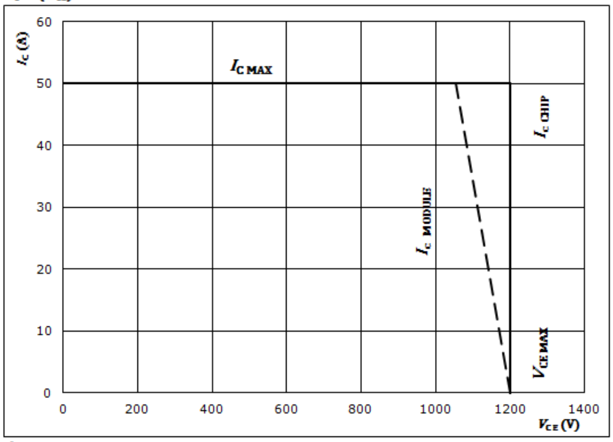


At		
V_{CE} =	600	V
V_{GE} =	±15	V
I_C=	25	A

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	32	Ω
R_{goff} =	32	Ω

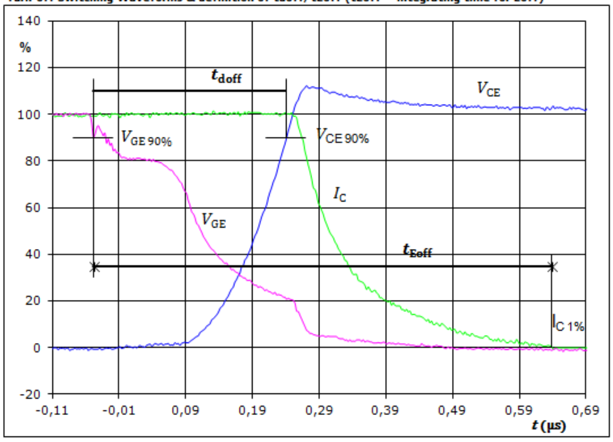
Brake Switching

General conditions

T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	32 Ω

Figure 1. IGBT

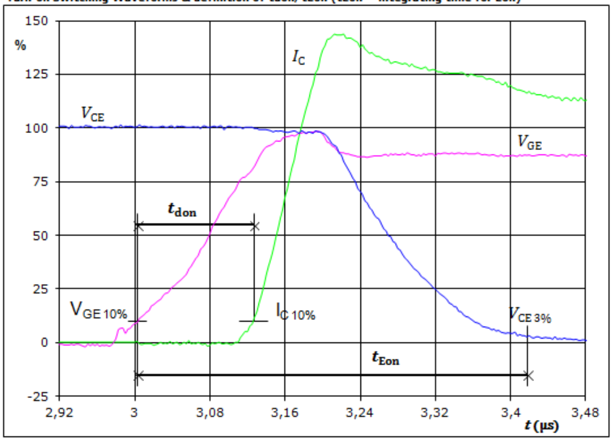
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	25	A
t_{doff} =	0,289	µs
t_{Eoff} =	0,687	µs

Figure 2. IGBT

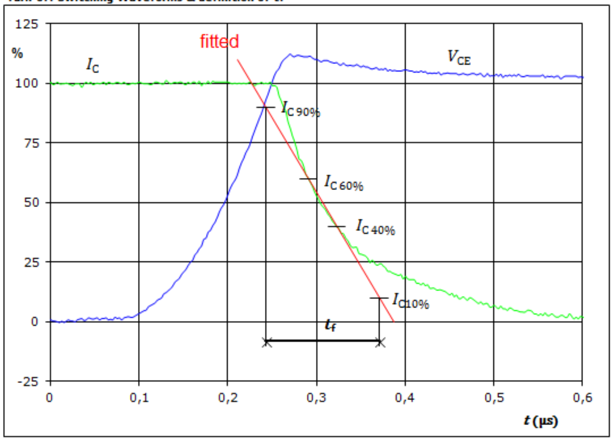
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	25	A
t_{don} =	0,123	µs
t_{Eon} =	0,415	µs

Figure 3. IGBT

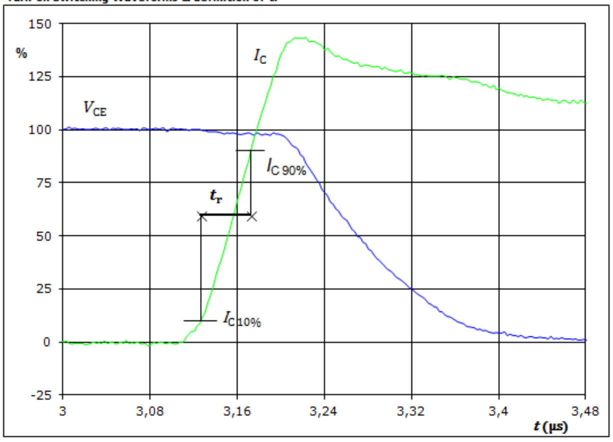
Turn-off Switching Waveforms & definition of tf



V_C(100%) =	600	V
I_C(100%) =	25	A
t_f =	0,130	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

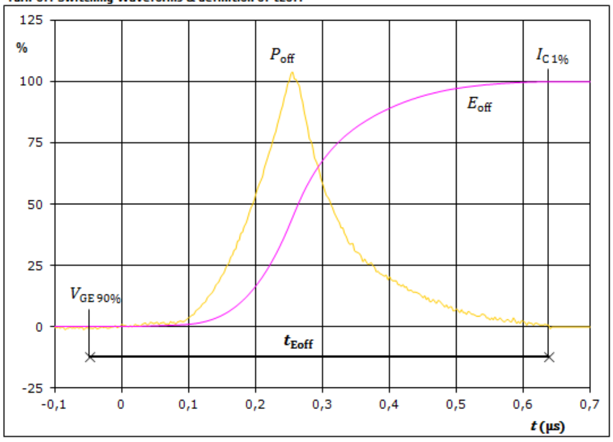


V_C(100%) =	600	V
I_C(100%) =	25	A
t_r =	0,046	µs

Brake Switching

Figure 5. **IGBT**

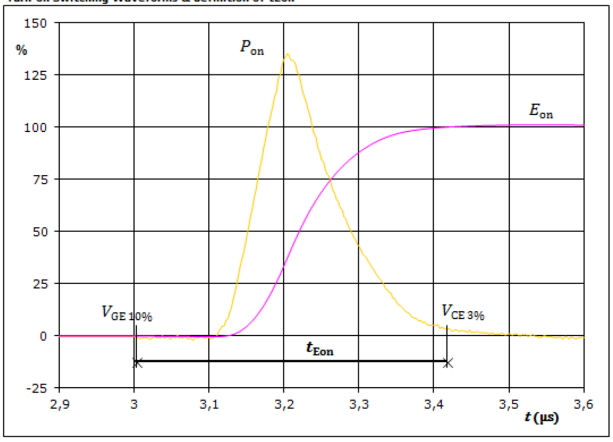
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	14,94	kW
E_{off} (100%) =	2,37	mJ
t_{Eoff} =	0,69	µs

Figure 6. **IGBT**

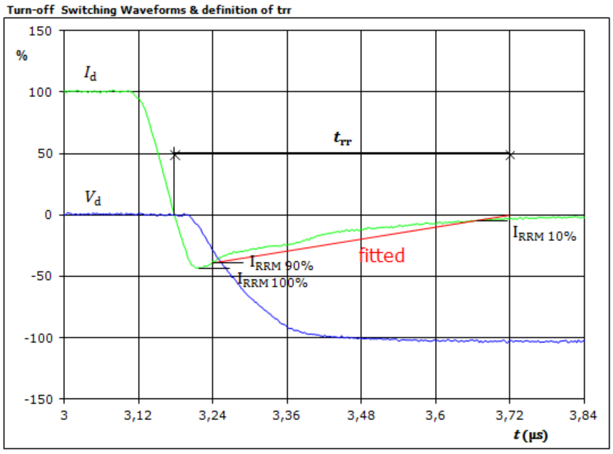
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	14,94	kW
E_{on} (100%) =	2,49	mJ
t_{Eon} =	0,41	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

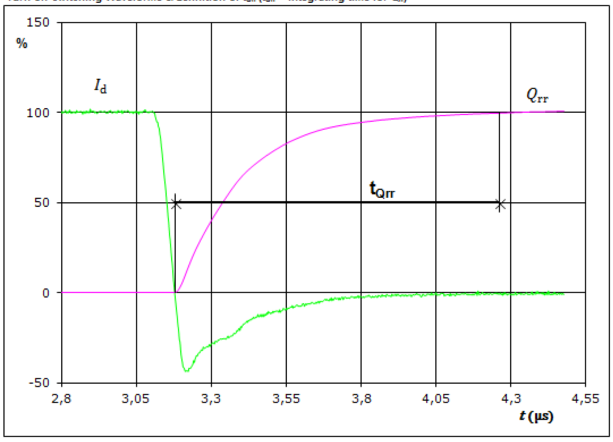


V_d (100%) =	600	V
I_d (100%) =	25	A
I_{RRM} (100%) =	-11	A
t_{rr} =	0,542	µs

Brake Switching

Figure 8. **FWD**

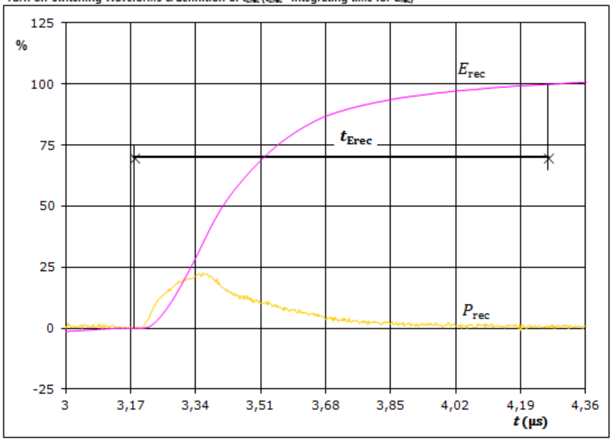
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	25	A
Q_{rr} (100%) =	2,58	µC
t_{Qrr} =	1,08	µs

Figure 9. **FWD**

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



P_{rec} (100%) =	14,94	kW
E_{rec} (100%) =	1,07	mJ
t_{Erec} =	1,08	µs

Ordering Code & Marking

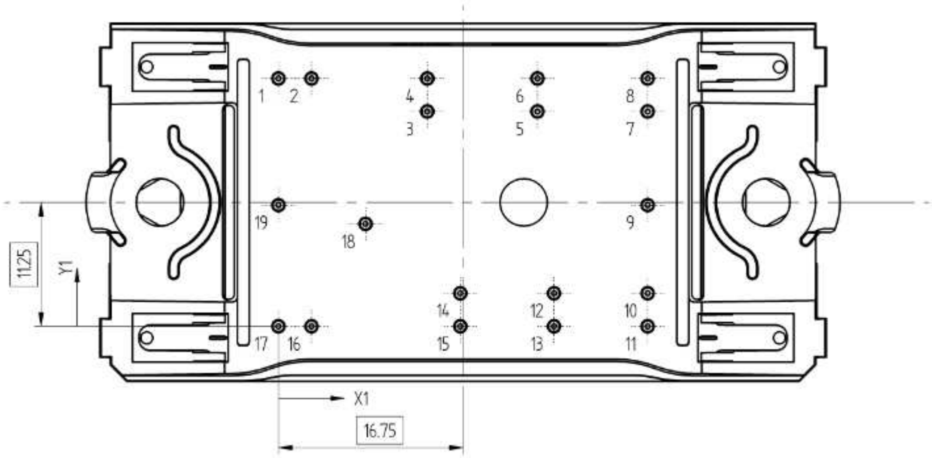
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	10-F0127PA025SC-L159E09	L159E09	L159E09
without thermal paste 12mm housing	10-FZ127PA025SC-L159E08	L159E08	L159E08

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		

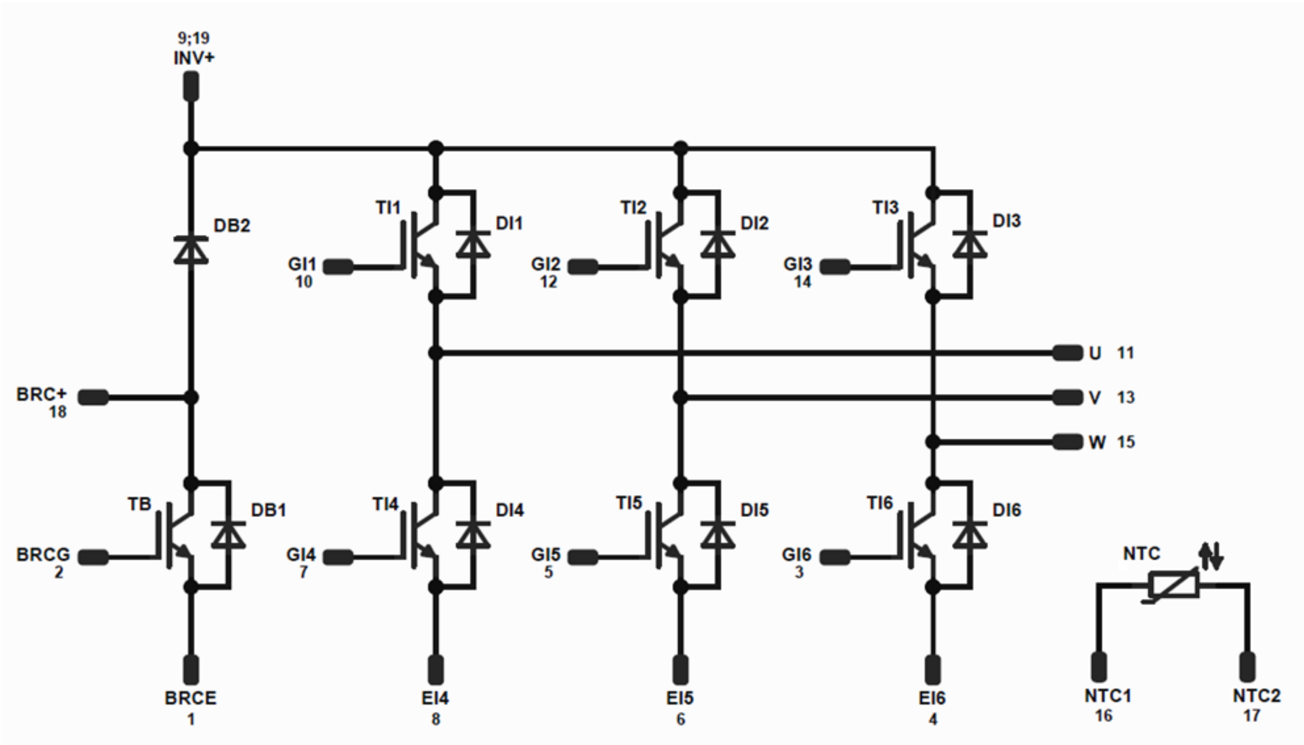
Outline

Pin table [mm]

Pin	X	Y	Function
1	0	22,5	BRCE
2	3	22,5	BRCG
3	13,5	19,5	GI6
4	13,5	22,5	EI6
5	23,5	19,5	GI5
6	23,5	22,5	EI5
7	33,5	19,5	GI4
8	33,5	22,5	EI4
9	33,5	11	INV+
10	33,5	3	GI1
11	33,5	0	U
12	25	3	GI2
13	25	0	V
14	16,5	3	GI3
15	16,5	0	W
16	3	0	NTC1
17	0	0	NTC2
18	7,9	9,3	BRC+
19	0	11	INV+



Pinout



Identification

ID	Component	Voltage	Technology	Current	Function	Comment
TI1,TI2, TI3, TI4,TI5,TI6	IGBT	1200V		25A	Inverter Switch	
DI1,DI2,DI3, DI4,DI5,DI6	FWD	1200V		25A	Inverter Diode	
TB	IGBT	1200V		25A	Brake Switch	
DB2	FWD	1200V		10A	Brake Diode	
DB1	FWD	1200V		3A	Brake Prot. Diode	
Rt	NTC	-		-	Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	135	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 packages see vincotech.com website.

Document No.:	Date:	Modification:	Pages
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