Vincotech

30-F2127PA050SC-L177E09
datasheet

flow **7PACK 2** | **1200 V / 50 A**

Features

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

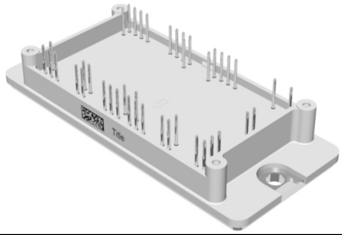
Target applications

- Motor Drive
- Power Generation

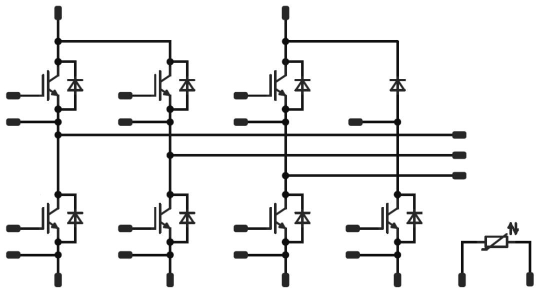
Types

- 30-F2127PA050SC-L177E09

flow 2 17mm housing



Schematic



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	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
Inverter Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	64	A
Repetitive peak forward current	I_{FRM}			100	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	127	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	46	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_j$max		105	A
Total power dissipation	P_{tot}	$T_j=T_j$max	T_S=80°C	135	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	28	A
Repetitive peak forward current	I_{FRM}			30	A
Total power dissipation	P_{tot}	$T_j=T_{jmax}$	T_h=80°C	66	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	26	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}			0,0017	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}							100		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,51		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 8 Ω R_{gon} = 8 Ω	±15	600	50	25 150		96 101		ns
Rise time	t_r					25 150		17 24		
Turn-off delay time	$t_{d(off)}$					25 150		214 281		
Fall time	t_f					25 150		87 122		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,8 µC Q_{rFWD} = 9,7 µC				25 150		2,701 4,211		mWs
Turn-off energy (per pulse)	E_{off}					25 150		2,744 4,531		

Inverter Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				50	25 125 150		1,74 1,79 1,77	2,05	V
Reverse leakage current	I_r			1200		25 150			10 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,75		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 3866 A/µs di/dt = 2820 A/µs	±15	600	50	25 150		81 85		A
Reverse recovery time	t_{rr}					25 150		139 316		ns
Recovered charge	Q_r					25 150		4,797 9,708		µC
Reverse recovered energy	E_{rec}					25 150		1,790 3,972		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		4803 1209		A/µs

Brake 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	$V_{GE(th)}$	$V_{CE}=V_{CE}$			0,0012	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		35	25 125 150	1,58	1,87 - 2,30	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25 125			5	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		2000		pF
Reverse transfer capacitance	C_{res}							70		

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,7		K/W

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	±15	600	35	25 125 150		86 87 89		ns
Rise time	t_r					25 125 150		42 43 42		
Turn-off delay time	$t_{d(off)}$					25 125 150		206 258 272		
Fall time	t_f					25 125 150		71 126 140		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,3 µC Q_{rFWD} = 3,9 µC Q_{rFWD} = 4,4 µC				25 125 150		2,600 3,278 3,463		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,058 3,158 3,526		

Brake Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				15	25 125 150		1,80 - 1,77	2,05	V
Reverse leakage current	I_r			1200		25 150			3,5 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						1,43		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 670 A/µs di/dt = 632 A/µs di/dt = 592 A/µs	±15	600	35	25 125 150		13 16 17		A
Reverse recovery time	t_{rr}					25 125 150		366 552 603		ns
Recovered charge	Q_r					25 125 150		2,330 3,923 4,389		µC
Reverse recovered energy	E_{rec}					25 125 150		0,966 1,677 1,890		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		41 41 41		A/µs

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				7,5	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 ʎ=3,4W/mK						1,79		K/W

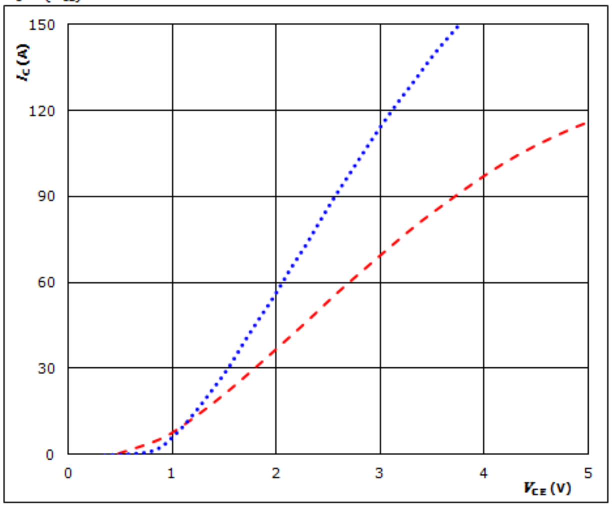
Thermistor

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

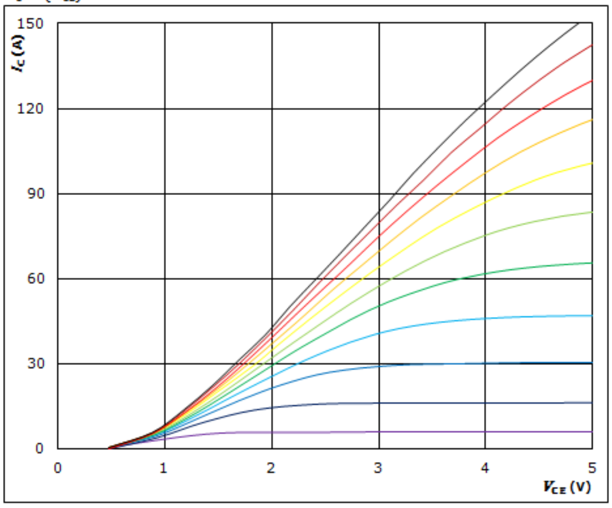
$I_C = f(V_{CE})$



t_p =	250	µs	25 °C	dotted
V_{GE}=	15	V	125 °C	solid
			150 °C	dashed

Typical output characteristics — IGBT

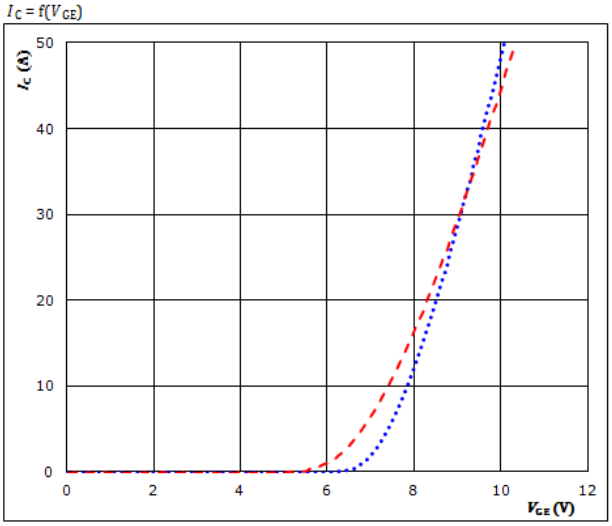
$I_C = f(V_{CE})$



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

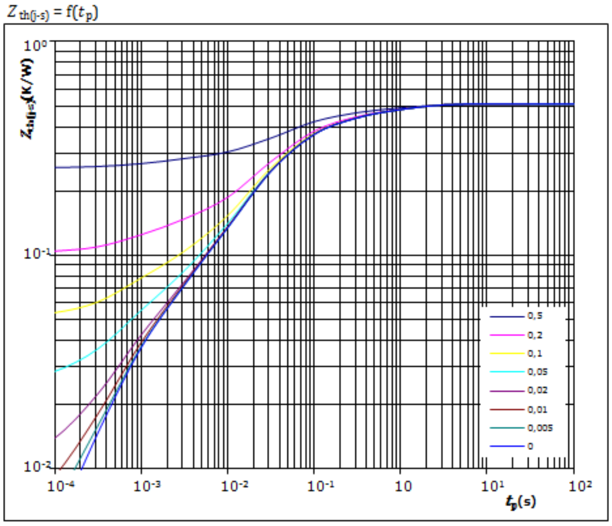
$I_C = f(V_{GE})$



t_p =	100	µs	25 °C	dotted
V_{CE} =	10	V	125 °C	solid
			150 °C	dashed

Transient Thermal Impedance as function of Pulse duration — IGBT

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,51	K/W

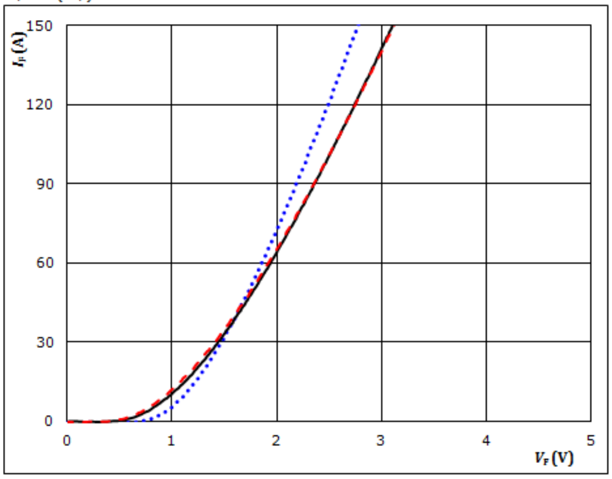
IGBT thermal model values

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

Inverter Diode Characteristics

Typical forward characteristics	FWD

$I_F = f(V_F)$

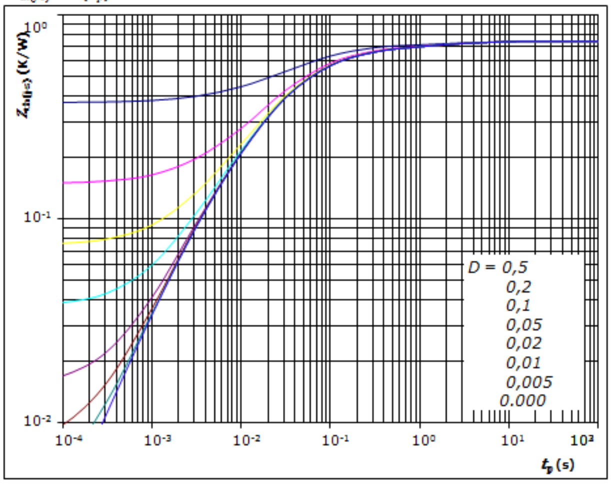


t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width	FWD

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 0,75 K/W

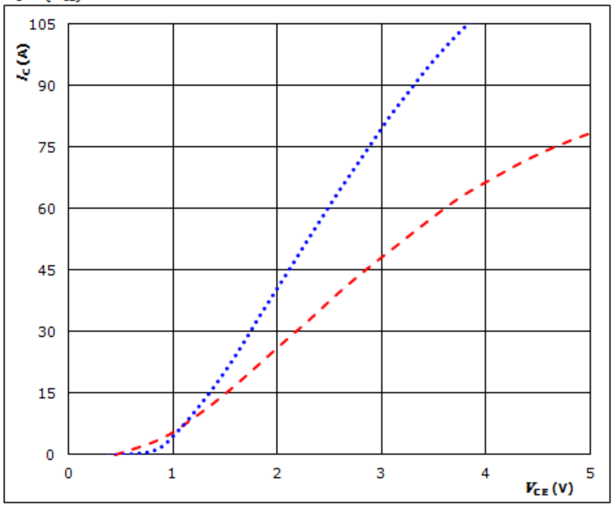
FWD thermal model values

R (K/W)	τ (s)
4,26E-02	3,64E+00
6,76E-02	6,18E-01
2,53E-01	8,65E-02
3,23E-01	2,11E-02
6,24E-02	3,47E-03

Brake Switch Characteristics

Typical output characteristics	**IGBT**

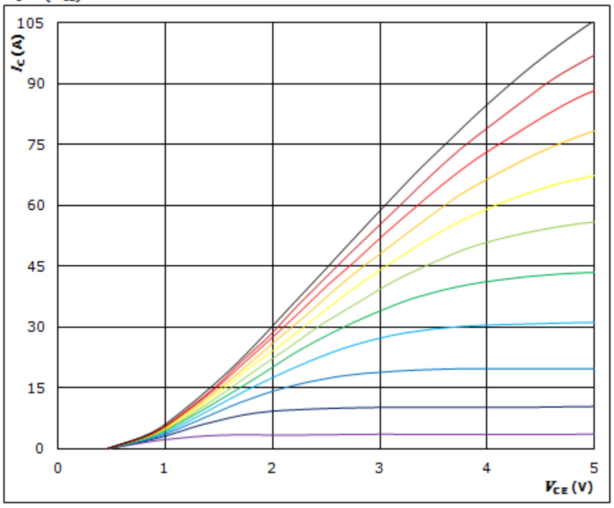
$I_C = f(V_{CE})$



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

Typical output characteristics	**IGBT**

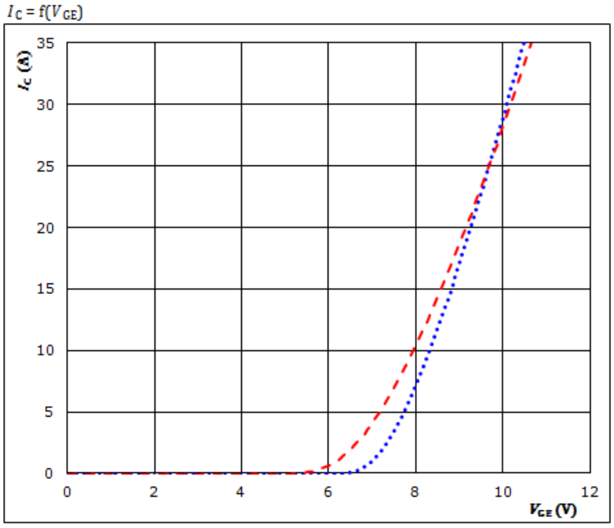
$I_C = f(V_{CE})$



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**

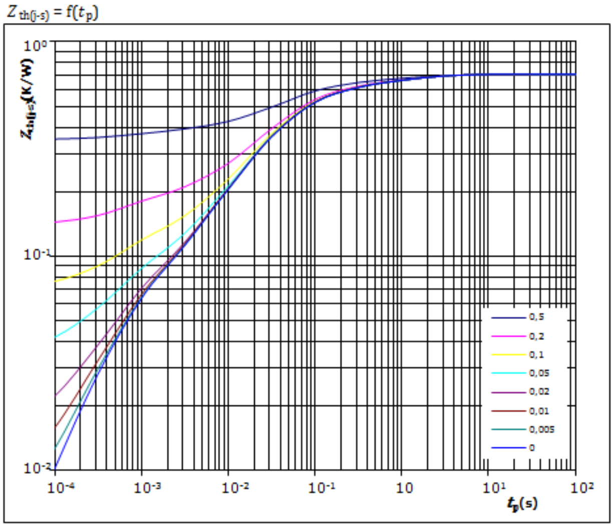
$I_C = f(V_{GE})$



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	
$R_{th(j\text{-}s)}$ =	0,7	K/W

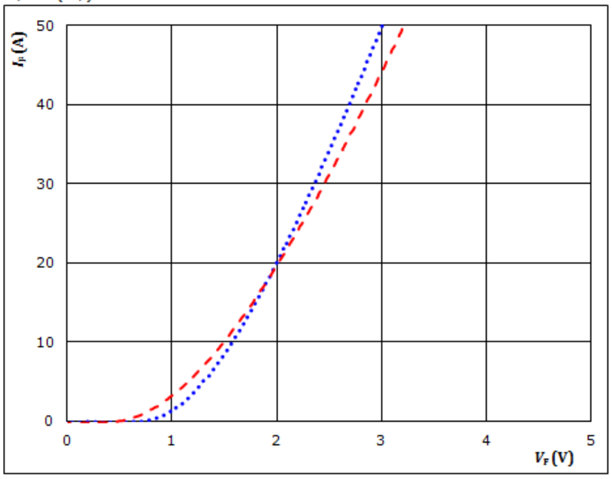
IGBT thermal model values

R_{th} (K/W)	τ (s)
8,05E-02	1,62E+00
1,47E-01	1,81E-01
3,23E-01	3,75E-02
9,88E-02	9,21E-03
5,47E-02	6,24E-04

Brake Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

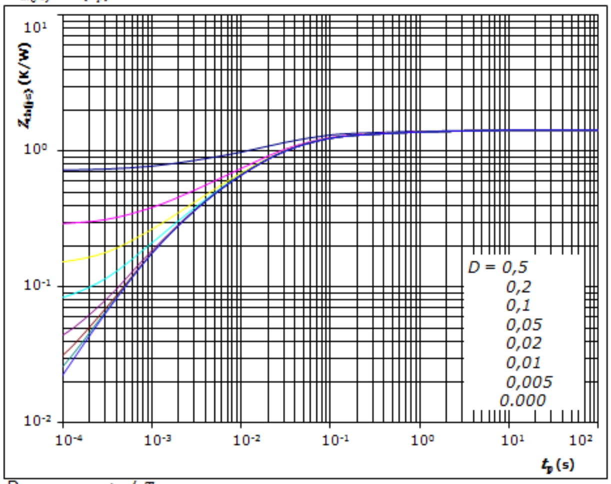


t_p = 250 µs

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

$R_{th(j\text{-}s)}$ = 1,43 K/W

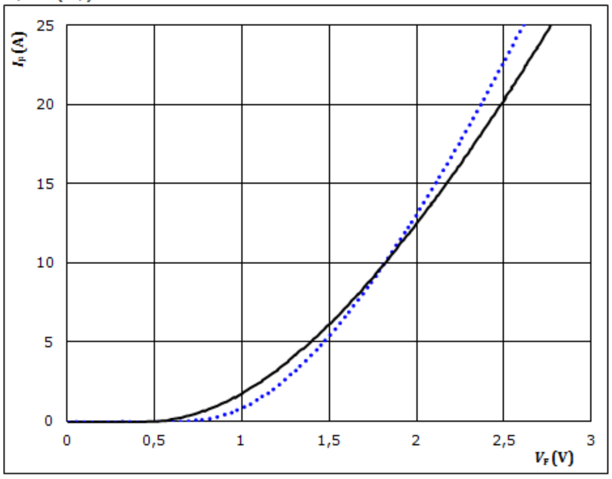
FWD thermal model values

R (K/W)	τ (s)
6,54E-02	2,71E+00
1,53E-01	2,26E-01
6,10E-01	3,14E-02
4,22E-01	7,43E-03
1,79E-01	1,18E-03

Brake Inverse Diode Characteristics

Typical forward characteristics	**FWD**

$I_F = f(V_F)$

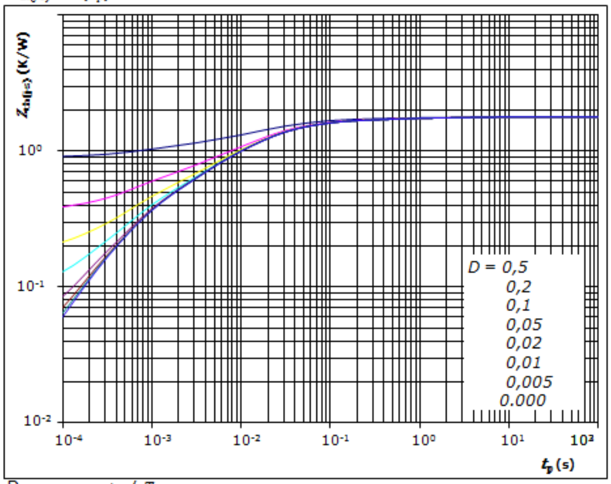


t_p = 250 μs

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

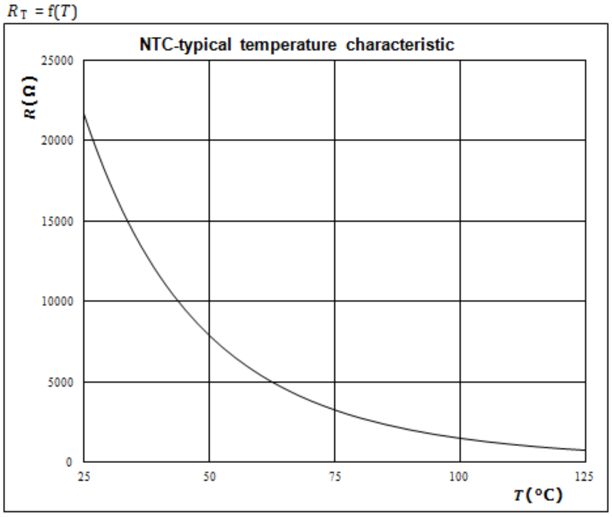
R (K/W)	τ (s)
5,84E-02	2,95E+00
1,15E-01	2,82E-01
4,08E-01	4,27E-02
6,64E-01	1,23E-02
2,86E-01	2,87E-03
2,62E-01	5,46E-04

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

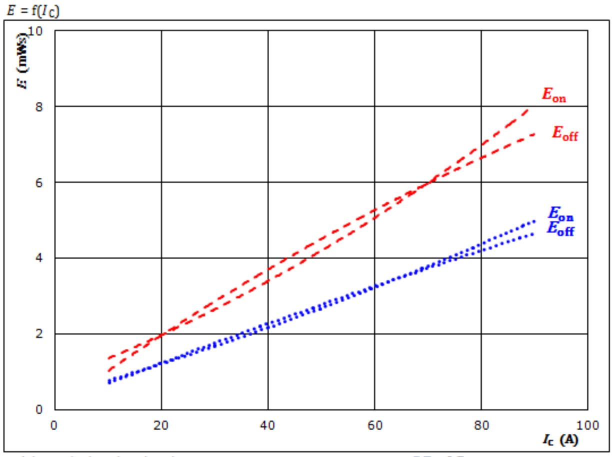


Inverter Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



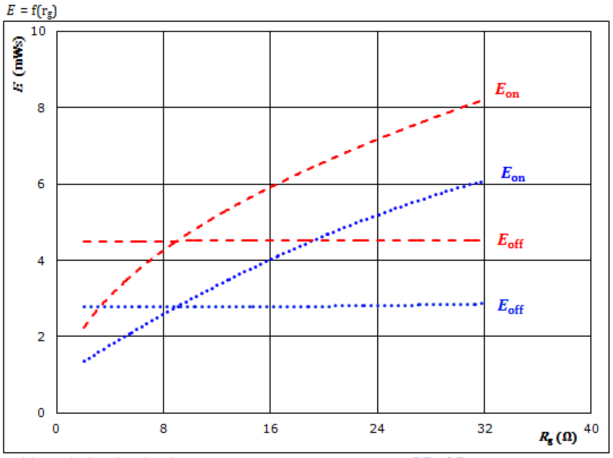
With an inductive load at

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

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



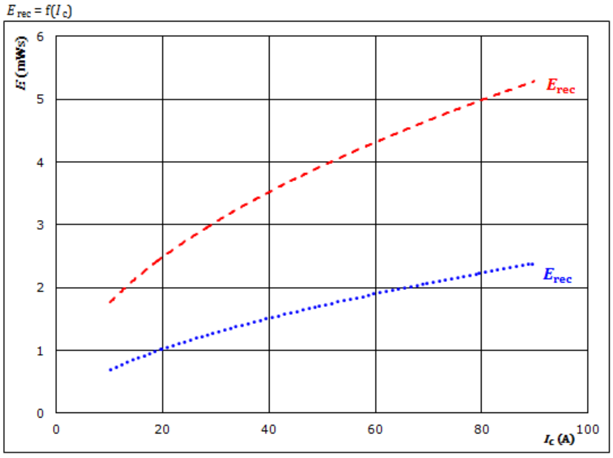
With an inductive load at

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

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



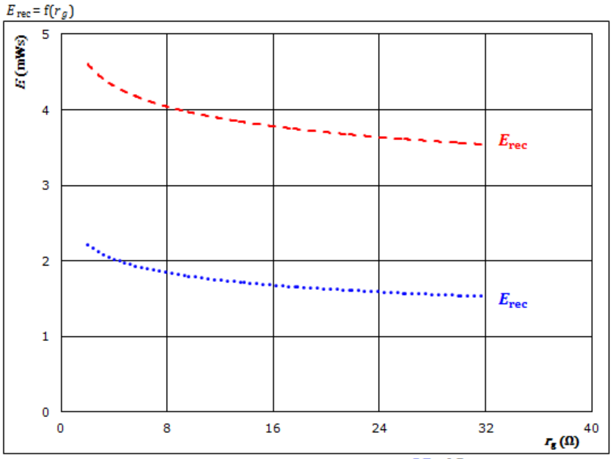
With an inductive load at

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

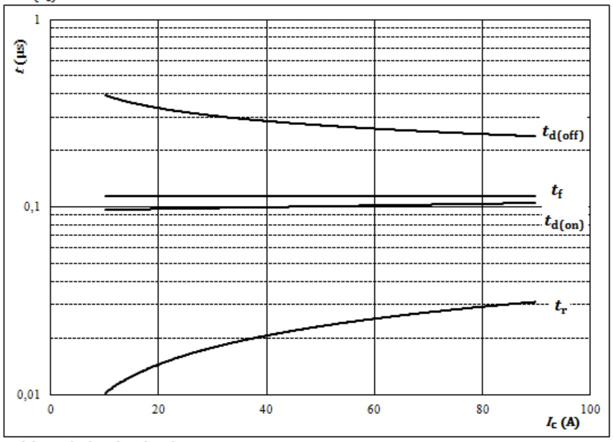
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	50	A		150 °C

Inverter Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



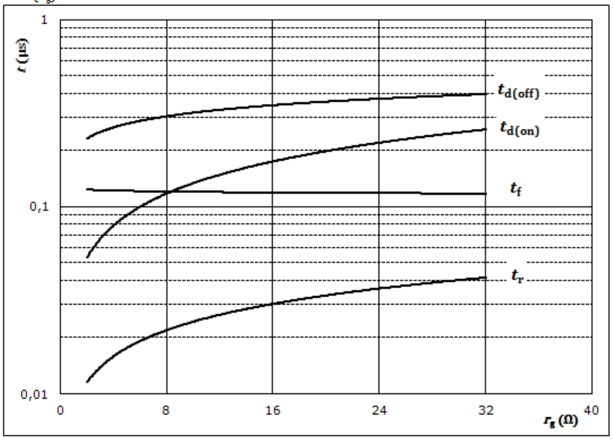
With an inductive load at

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

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



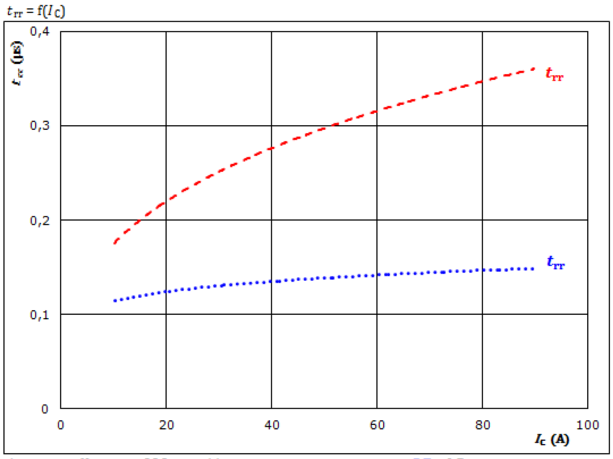
With an inductive load at

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

$t_{rr} = f(I_C)$

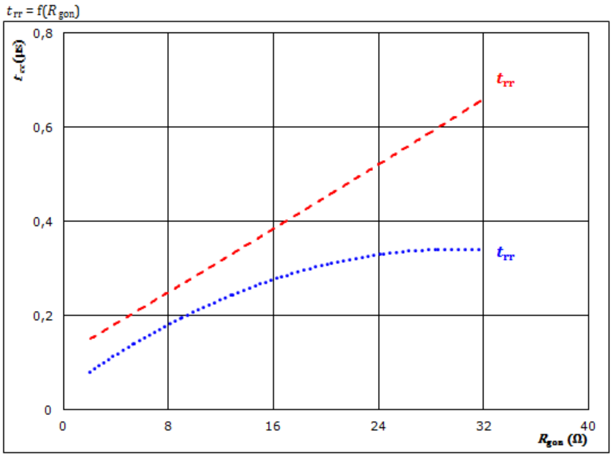


At					
V_{CE} =	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	8	Ω		150 °C	– – – –

Figure 8. **FWD**

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

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



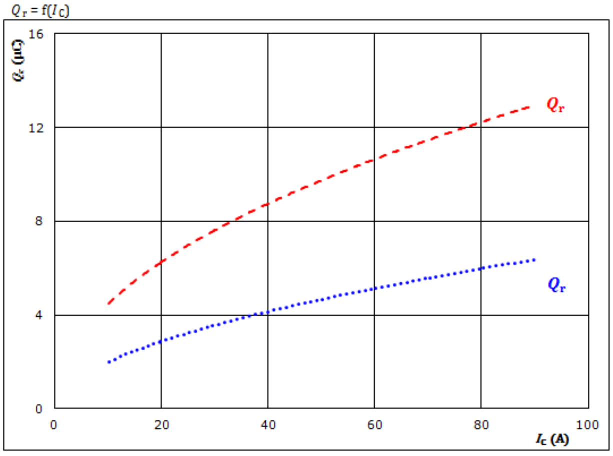
At					
V_{CE} =	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	50	A		150 °C	– – – –

Inverter Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

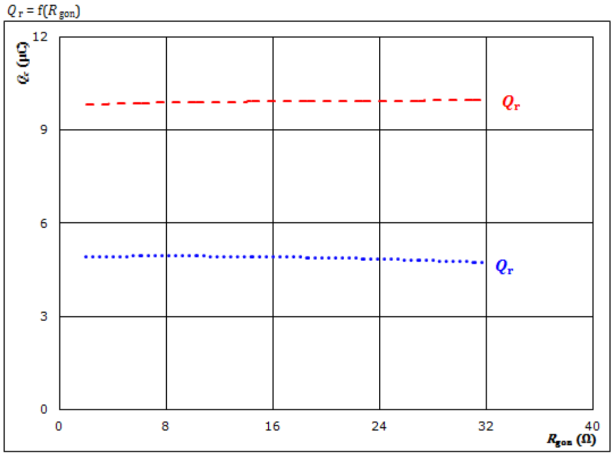


At	V_{CE} =	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	8	Ω		150 °C	– – – –

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

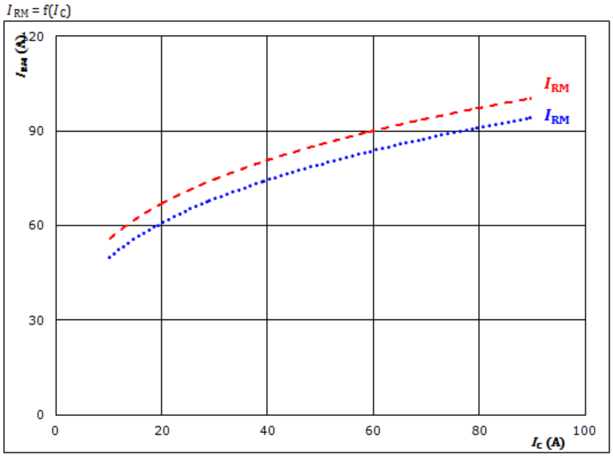


At	V_{CE}=	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	50	A		150 °C	– – – –

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

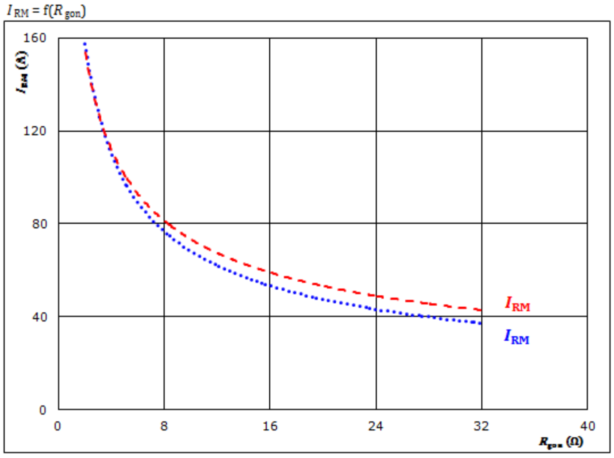


At	V_{CE}	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	8	Ω		150 °C	– – – –

Figure 12. **FWD**

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

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



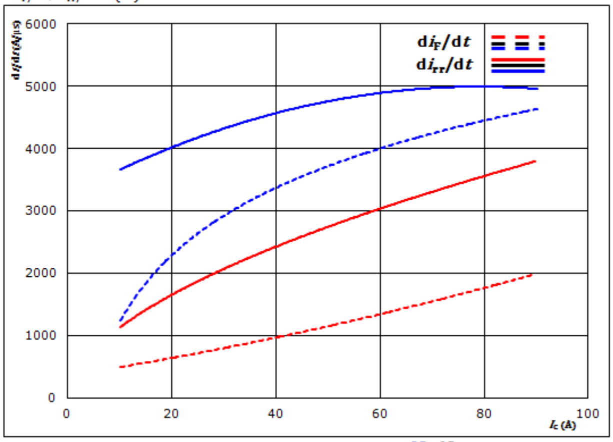
At	V_{CE} =	600	V		25 °C	···········
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	50	A		150 °C	– – – –

Inverter Switching Characteristics

Figure 13. **FWD**

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

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

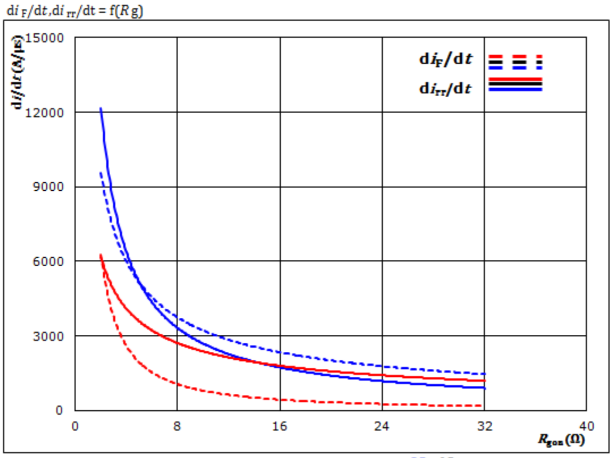


At					
V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
R_{gon} =	8	Ω		150 °C	– – –

Figure 14. **FWD**

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

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

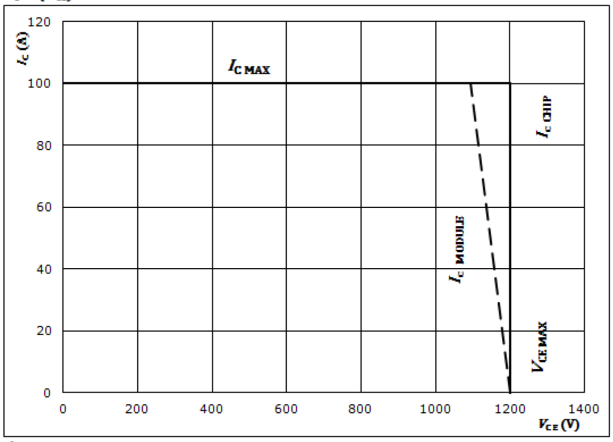


At					
V_{CE} =	600	V	T_j:	25 °C	···········
V_{GE} =	±15	V		125 °C	———
I_C =	50	A		150 °C	– – –

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

Vincotech

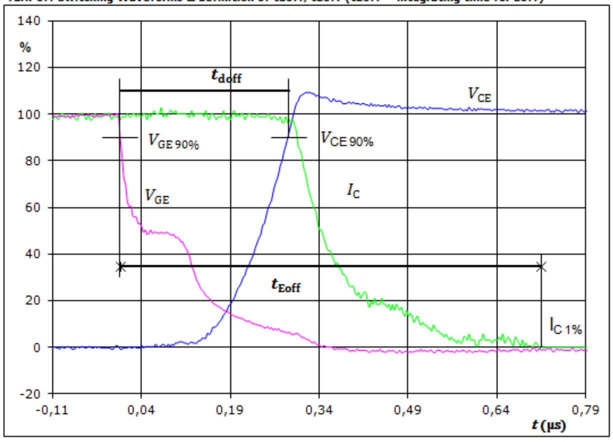
Inverter Switching Definitions

General conditions

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

Figure 1. IGBT

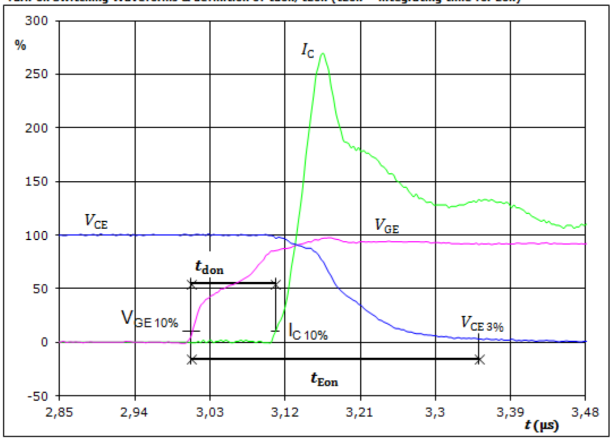
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	50	A
t_{doff} =	0,281	μs
t_{Eoff} =	0,710	μs

Figure 2. IGBT

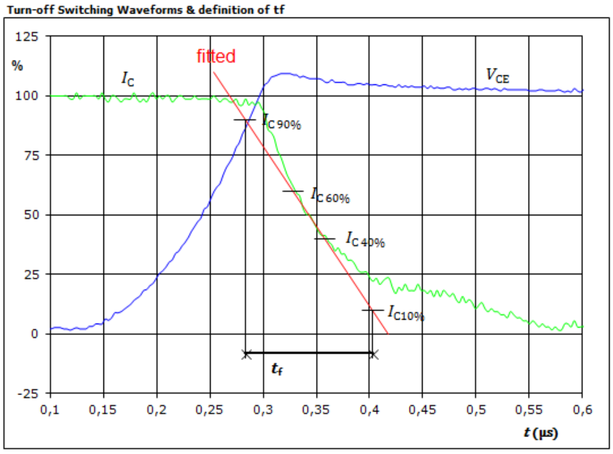
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE}(0%) =	-15	V
V_{GE}(100%) =	15	V
V_C(100%) =	600	V
I_C(100%) =	50	A
t_{don} =	0,101	μs
t_{Eon} =	0,345	μs

Figure 3. IGBT

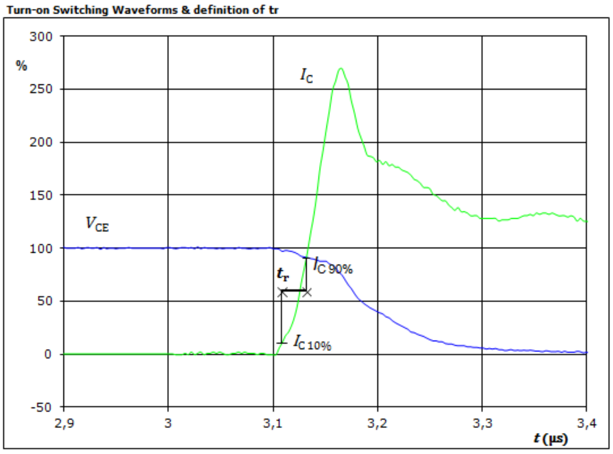
Turn-off Switching Waveforms & definition of tf



V_C(100%) =	600	V
I_C(100%) =	50	A
t_f =	0,122	μs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

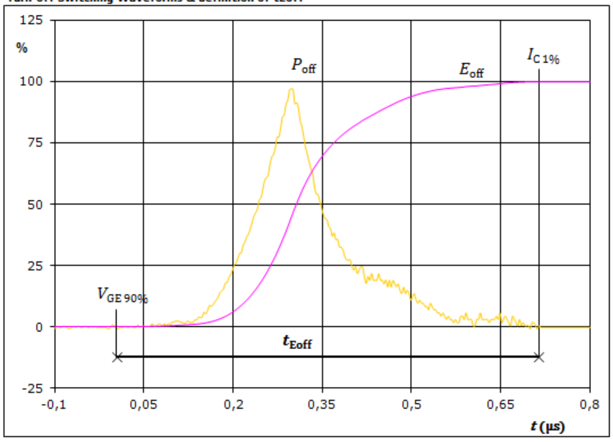


V_C(100%) =	600	V
I_C(100%) =	50	A
t_r =	0,024	μs

Inverter Switching Definitions

Figure 5. **IGBT**

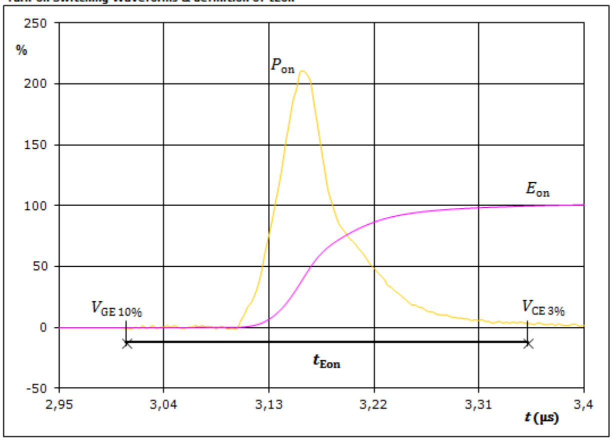
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	30,10	kW
E_{off} (100%) =	4,53	mJ
t_{Eoff} =	0,71	µs

Figure 6. **IGBT**

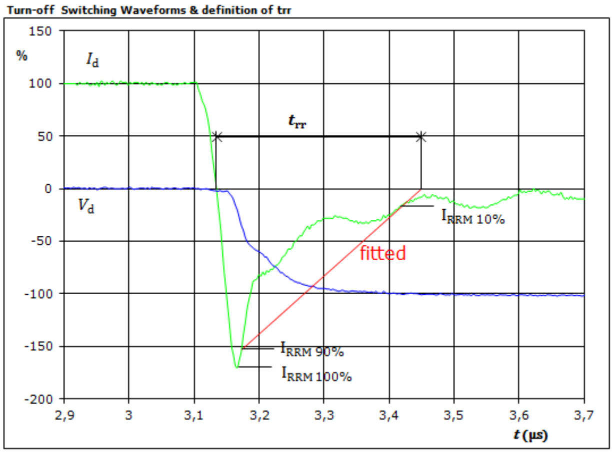
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	30,10	kW
E_{on} (100%) =	4,21	mJ
t_{Eon} =	0,345	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

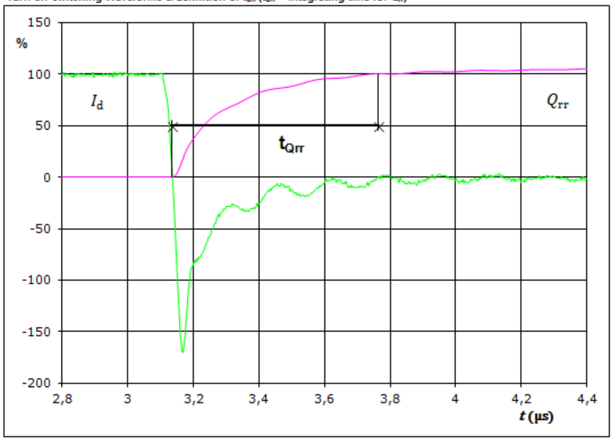


V_d (100%) =	600	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-85	A
t_{rr} =	0,316	µs

Inverter Switching Definitions

Figure 8. **FWD**

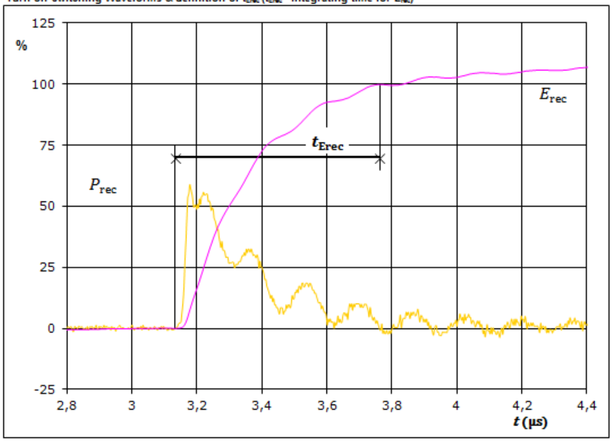
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	50	A
Q_{rr} (100%) =	9,71	μC
t_{Qrr} =	0,63	μs

Figure 9. **FWD**

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



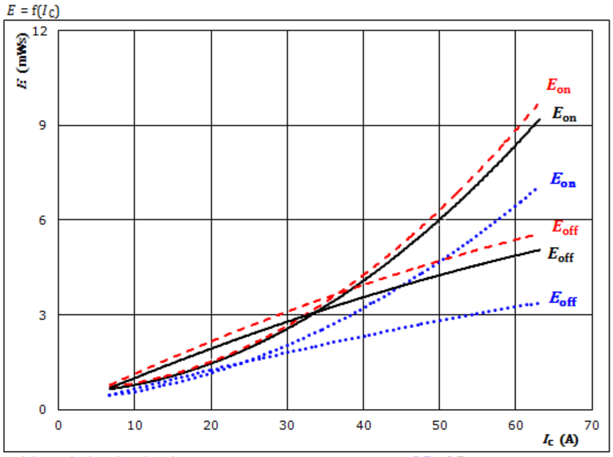
P_{rec} (100%) =	30,10	kW
E_{rec} (100%) =	3,97	mJ
t_{Erec} =	0,63	μs

Brake Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



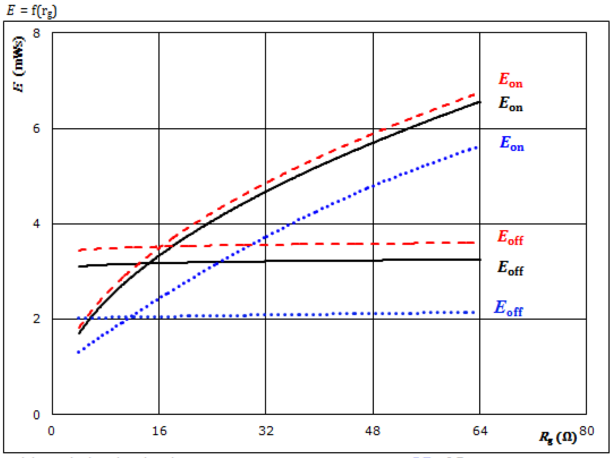
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	16	Ω		150 °C	dashed
R_{goff} =	16	Ω			

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



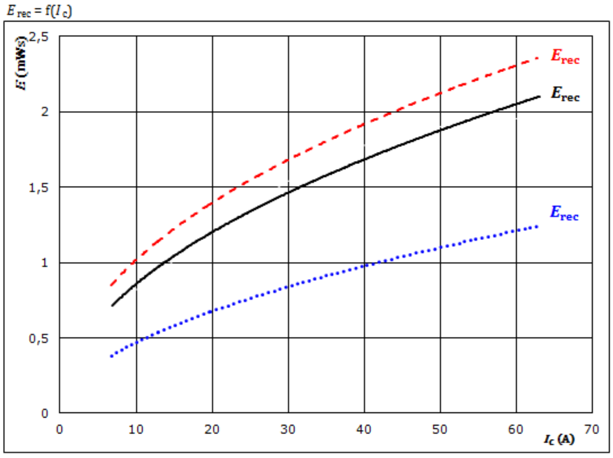
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	35	A		150 °C	dashed

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



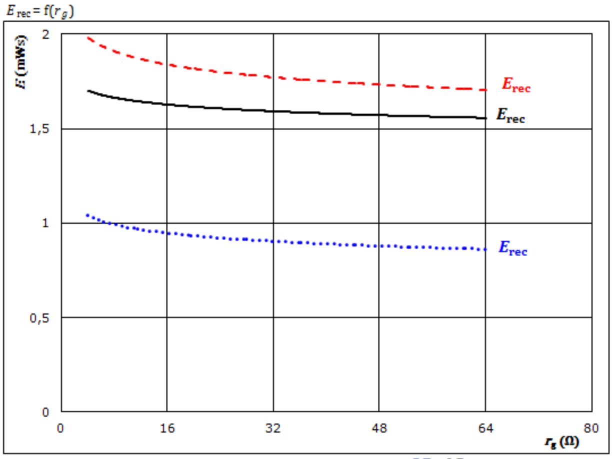
With an inductive load at

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

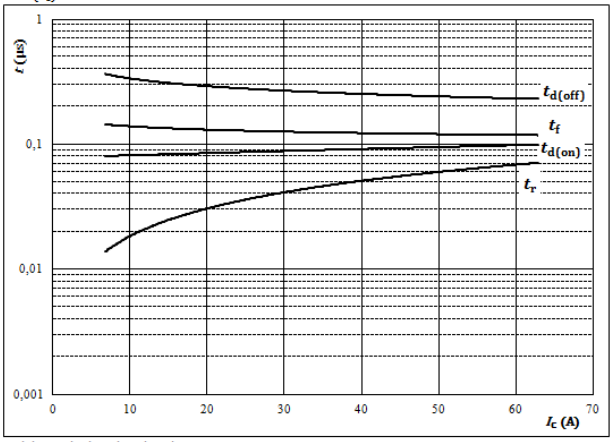
V_{CE} =	600	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	35	A		150 °C	dashed

Brake Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



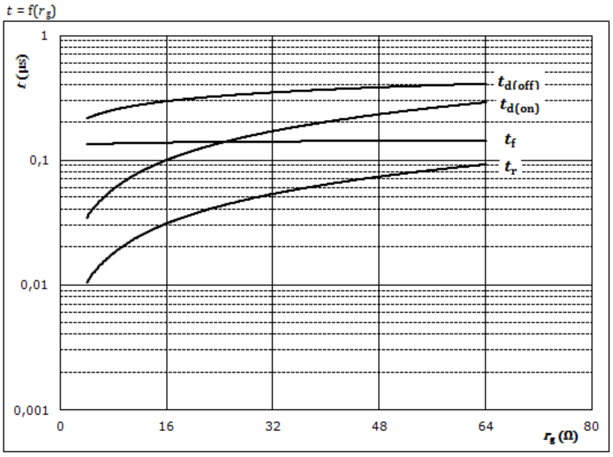
With an inductive load at

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

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



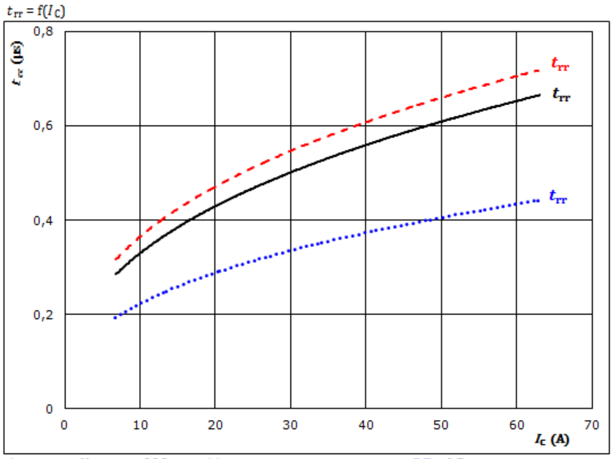
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	35	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

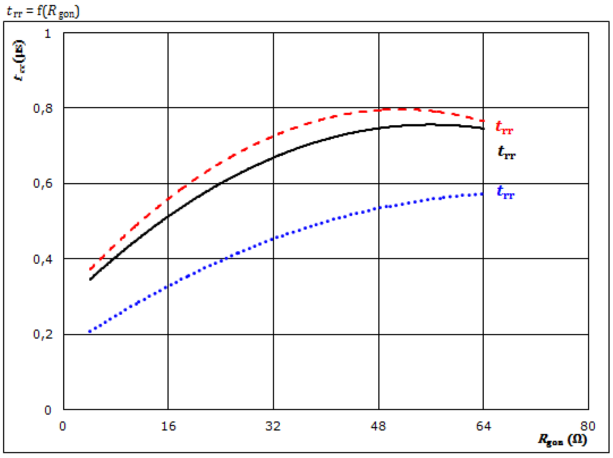


At					
V_{CE}=	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	16	Ω		150 °C	– – – –

Figure 8. **FWD**

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

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



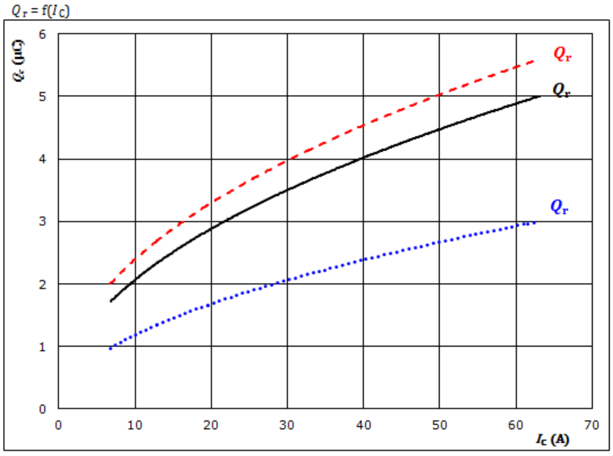
At					
V_{CE} =	600	V		25 °C	···········
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	35	A		150 °C	– – – –

Brake Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

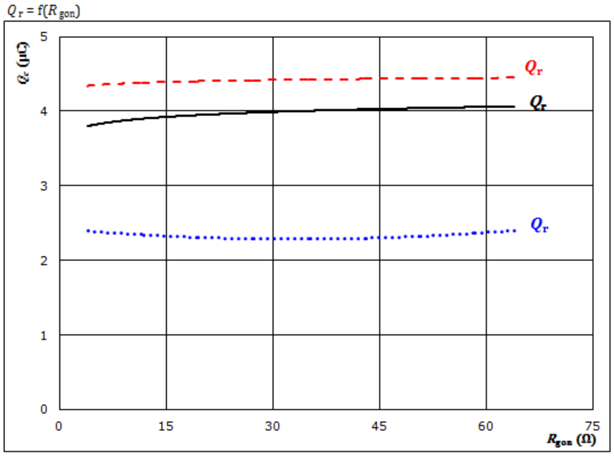


At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

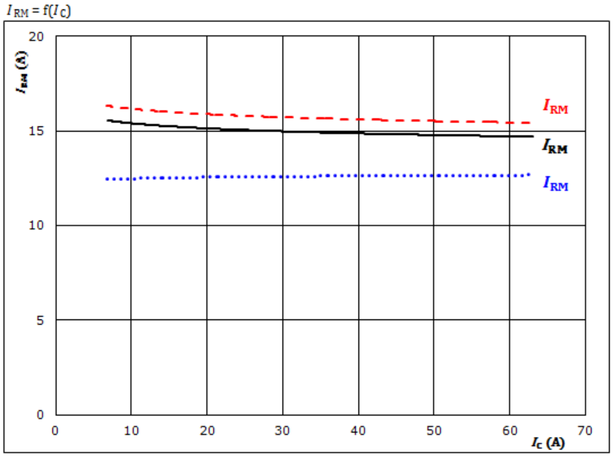


At						
	V_{CE}=	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	35	A		150 °C	

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

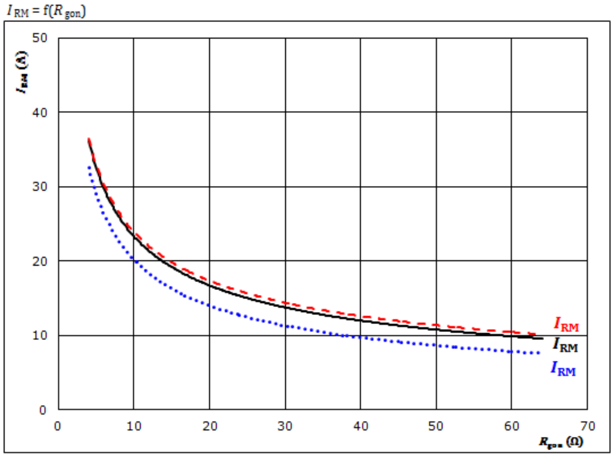


At						
	V_{CE}	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	16	Ω		150 °C	

Figure 12. **FWD**

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

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



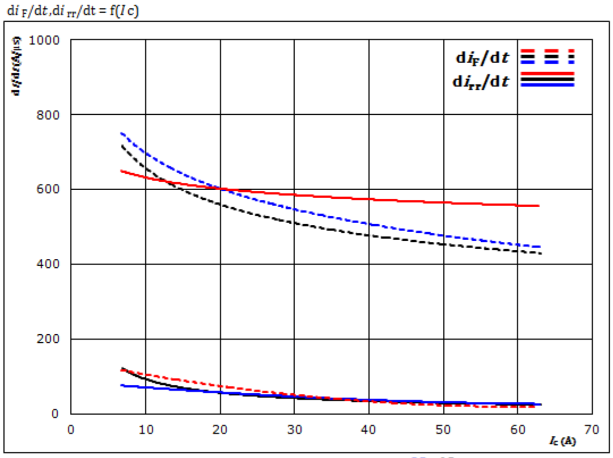
At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	35	A		150 °C	

Brake Switching Characteristics

Figure 13. **FWD**

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

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

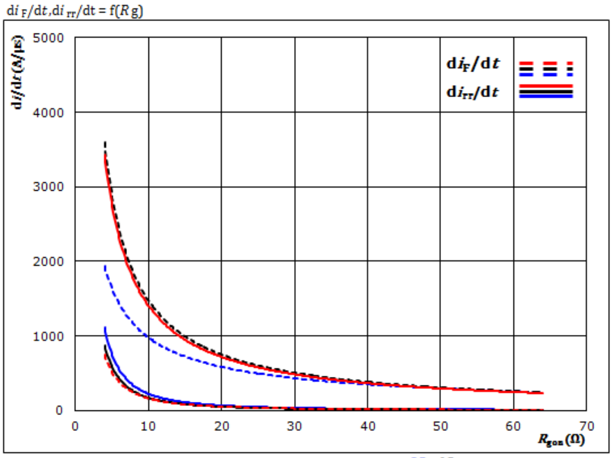


At	V_{CE}	600	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	R_{gon} =	16	Ω		150	°C

Figure 14. **FWD**

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

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

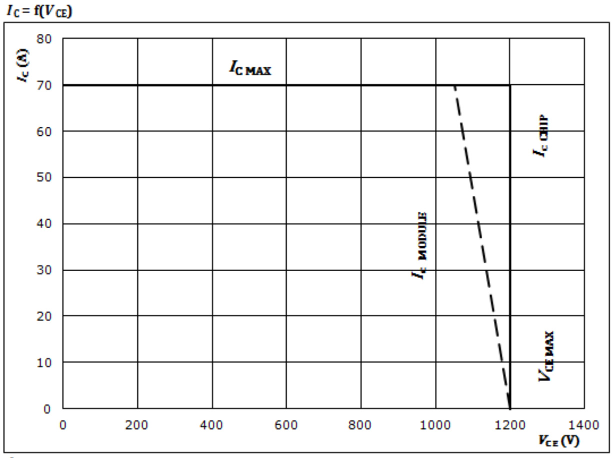


At	V_{CE} =	600	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	I_C=	35	A		150	°C

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

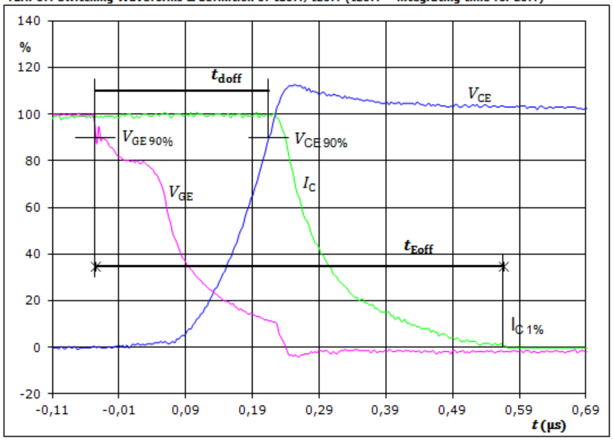
Brake Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	16 Ω
R_{goff}	=	16 Ω

Figure 1. IGBT

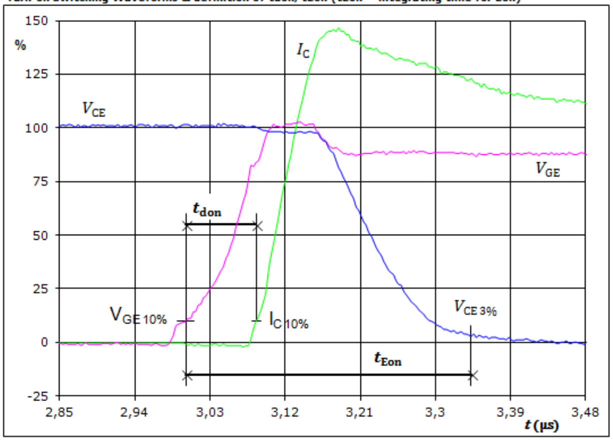
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	35	A
t_{doff} =	0,258	μs
t_{Eoff} =	0,612	μs

Figure 2. IGBT

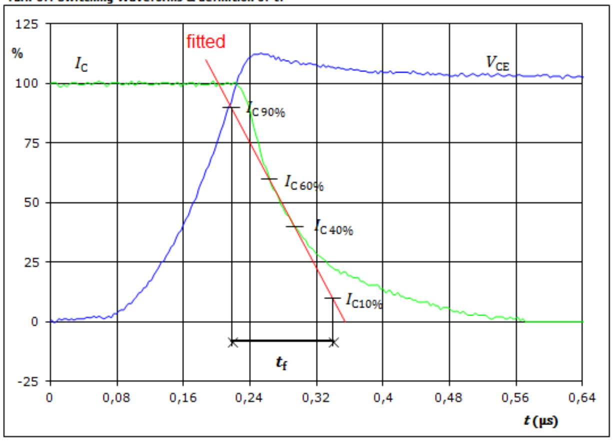
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	35	A
t_{don} =	0,087	μs
t_{Eon} =	0,342	μs

Figure 3. IGBT

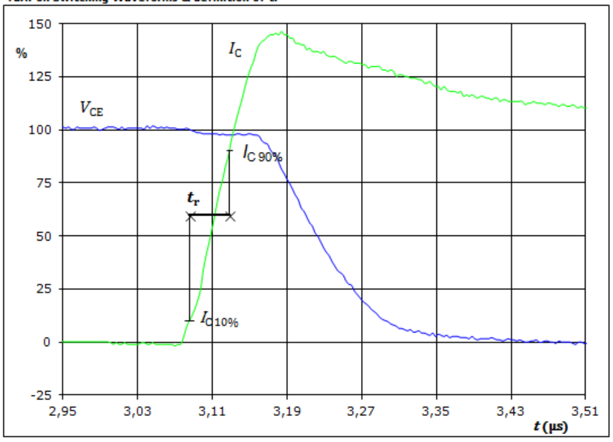
Turn-off Switching Waveforms & definition of tf



V_C (100%) =	600	V
I_C (100%) =	35	A
t_f =	0,126	μs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

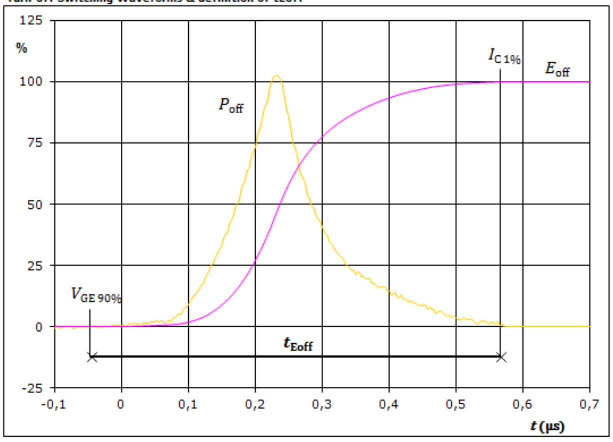


V_C (100%) =	600	V
I_C (100%) =	35	A
t_r =	0,043	μs

Brake Switching Definitions

Figure 5. **IGBT**

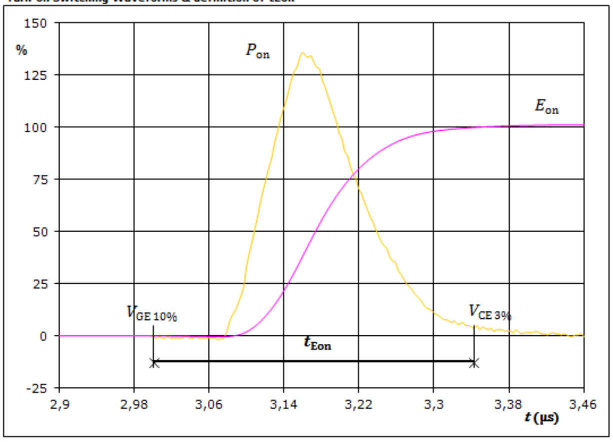
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	20,92	kW
E_{off} (100%) =	3,16	mJ
t_{Eoff} =	0,612	µs

Figure 6. **IGBT**

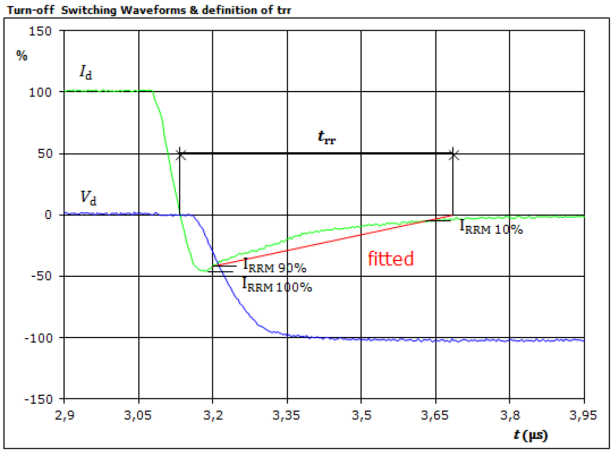
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	20,92	kW
E_{on} (100%) =	3,28	mJ
t_{Eon} =	0,342	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

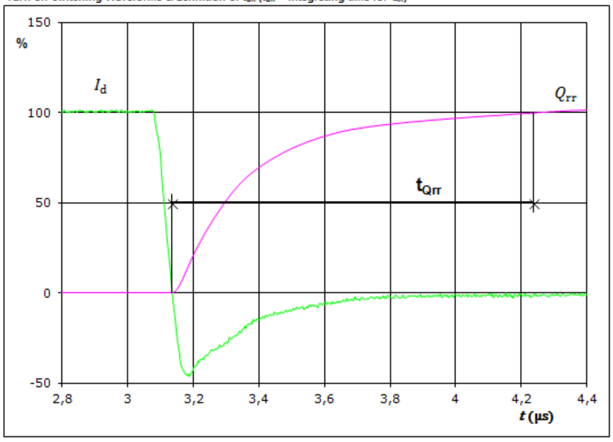


V_d (100%) =	600	V
I_d (100%) =	35	A
I_{RRM} (100%) =	-16	A
t_{rr} =	0,552	µs

Brake Switching Definitions

Figure 8. **FWD**

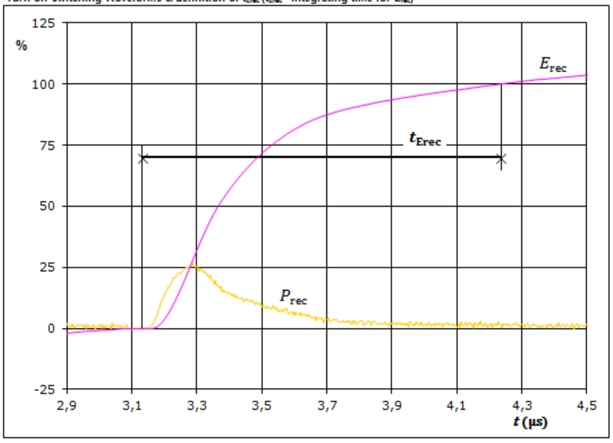
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	35	A
Q_{rr} (100%) =	3,92	µC
t_{Qrr} =	1,10	µs

Figure 9. **FWD**

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



P_{rec} (100%) =	20,92	kW
E_{rec} (100%) =	1,68	mJ
t_{Erec} =	1,10	µs

Ordering Code & Marking

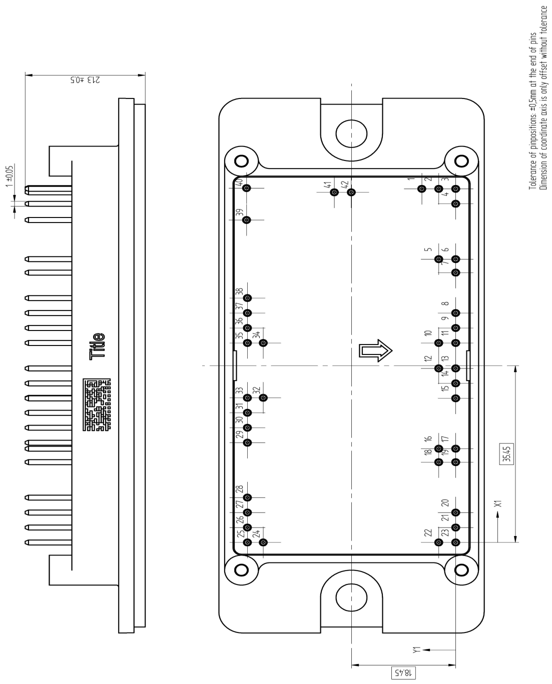
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	30-F2127PA050SC-L177E09	L177E09	L177E09

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

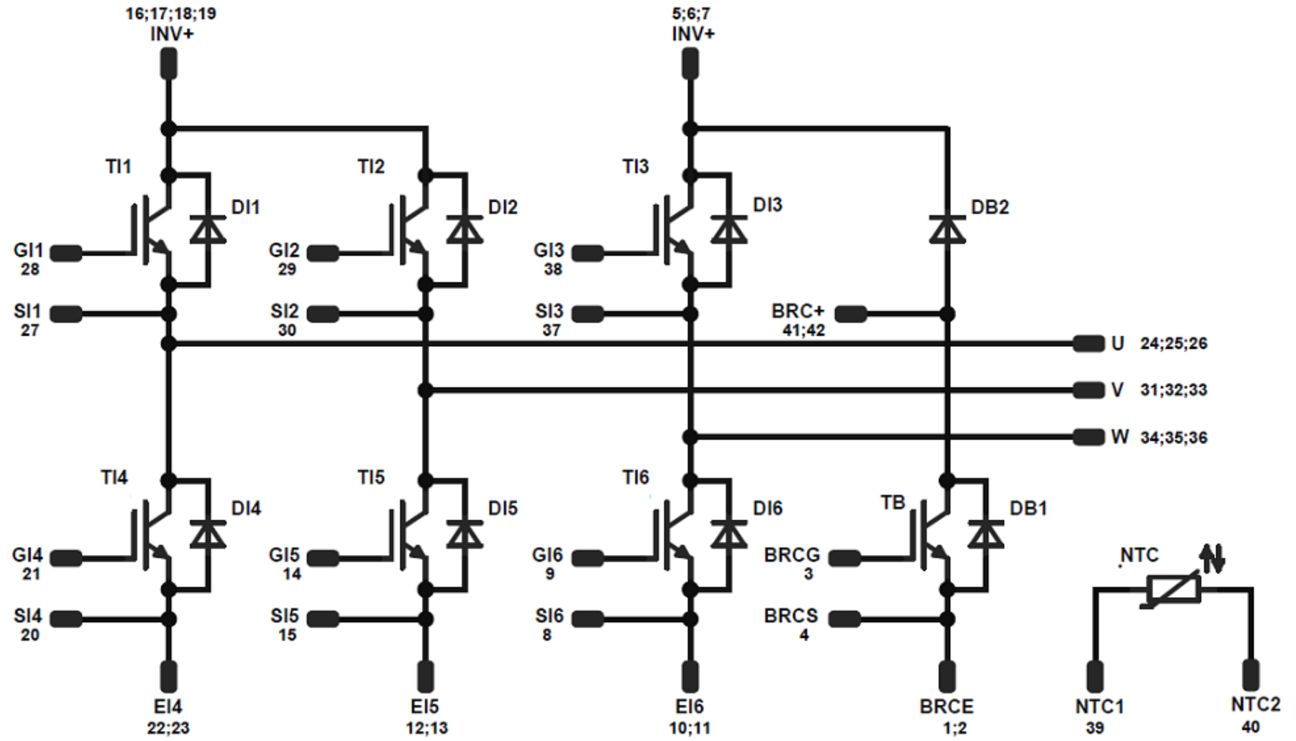
Outline

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
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	50A	Inverter Switch	
DI1-DI6	FWD	1200V	50A	Inverter Diode	
TB	IGBT	1200V	35A	Brake Switch	
DB2	FWD	1200V	15A	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.

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