Vincotech

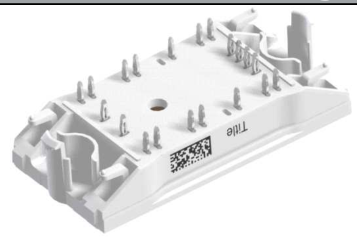
10-PZ12NMA080SH23-M260F03Y
datasheet

flow MNPC 0	1200 V / 80 A

Features

- mixed voltage component topology
- neutral point clamped inverter
- reactive power capability
- low inductance layout
- improved LVRT

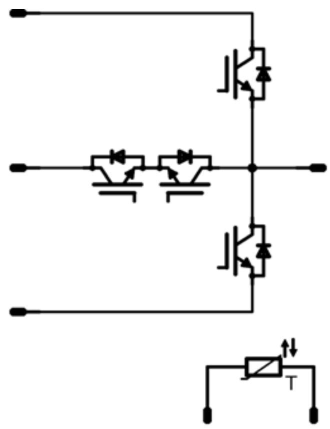
flow 0 12mm housing



Target applications

- Solar inverter
- UPS

Schematic



Types

- 10-PZ12NMA080SH23-M260F03Y

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Half Bridge Switch					
Collector-emitter break down voltage	V_{CES}			1200	V
DC collector current	I_C	$T_j=T_jmax$	T_h=80°C	67	A
Pulsed collector current	I_{CRM}	t_p limited by T_jmax		240	A
Power dissipation	P_{tot}	$T_j=T_jmax$	T_h=80°C	153	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	Tj≤ 150°C VGE= 15V		10 800	μs V
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Half Bridge Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j=T_{jmax}$	T_h=80°C	46	A
Repetitive peak forward current	I_{FRM}			100	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	Condition		Value	Unit
Neutral Point Switch					
Collector-emitter break down voltage	V_{CES}			600	V
DC collector current	I_C	$T_j=T_j$max	T_h=80°C	49	A
Pulsed collector current	I_{CRM}	t_p limited by $T_j$max		225	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80°C	68	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	Tj≤ 150°C VGE= 15V		6 360	μs V
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Neutral Point Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_h = 80°C	49	A
Repetitive peak forward current	I_{FRM}			150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_h = 80°C	59	W
Maximum Junction Temperature	T_{jmax}			175	°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				8,95	mm
Comparative Tracking Index	CTI			>200	

Characteristic Values

Half Bridge 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	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,003	25 125	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		80	25 125 150	1,7	1,99 2,33 2,41	2,4	V
Collector-emitter cut-off	I_{CES}		0	1200		25 125			10	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			240	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f = 1MHz	0	25		25		4660		pF
Reverse transfer capacitance	C_{rss}	f = 1MHz	0	25		25		260		pF
Thermal										
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness≤50um λ = 1 W/mK						0,62		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	50	25 125		77 79		ns
Rise time	t_r	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	50	25 125		11 14		ns
Turn-off delay time	$t_{d(off)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	50	25 125		180 242		ns
Fall time	t_f	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	50	25 125		48 76		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 2,1 µC Q_{rFWD} = 3,8 µC	±15	350	50	25 125		0,524 0,980		mWs
Turn-off energy (per pulse)	E_{off}	Q_{rFWD} = 2,1 µC Q_{rFWD} = 3,8 µC	±15	350	50	25 125		1,314 2,275		mWs

Characteristic Values

Neutral Point 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		1,53 1,49 1,47	1,77	V
Reverse leakage current	I_r			650		25 150			3,8 -	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j\text{-}s)}$	Thermal grease thickness≤50um λ = 1 W/mK						1,61		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 5245 A/µs di/dt = 3680 A/µs	±15	350	50	25 125		63 73		A
Reverse recovery time	t_{rr}					25 125		52 92		ns
Recovered charge	Q_r					25 125		2,059 3,800		µC
Reverse recovered energy	E_{rec}					25 125		0,474 0,845		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		1198 852		A/µs

Characteristic Values

Neutral Point 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	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,0012	25 125	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150	1,05	1,45 1,59 1,64	1,85	V
Collector-emitter cut-off	I_{CES}		0	600		25 125			3,8	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			600	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		4620		pF
Output capacitance	C_{oss}							288		
Reverse transfer capacitance	C_{rss}							137		
Gate charge	Q_G		15	480	75	25		470		nC
Thermal										
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness≤50um λ = 1 W/mK						1,40		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	55	25 125		84 85		ns
Rise time	t_r					25 125		11 12		
Turn-off delay time	$t_{d(off)}$					25 125		177 205		
Fall time	t_f					25 125		87 105		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 5,3 µC Q_{rFWD} = 8,2 µC				25 125		0,528 0,747		mWs
Turn-off energy (per pulse)	E_{off}					25 125		1,860 2,500		

Characteristic Values

Half Bridge 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		1,73 1,70 1,68	2,05	V
Reverse leakage current	I_r			1200		25 150			10	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Thermal grease thickness≤50um λ = 1 W/mK						1,29		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 6090 A/µs di/dt = 5325 A/µs	±15	350	55	25 125		106 118		A
Reverse recovery time	t_{rr}					25 125		102 148		ns
Recovered charge	Q_r					25 125		5,316 8,219		µC
Reverse recovered energy	E_{rec}					25 125		1,551 2,418		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		6904 4951		A/µs

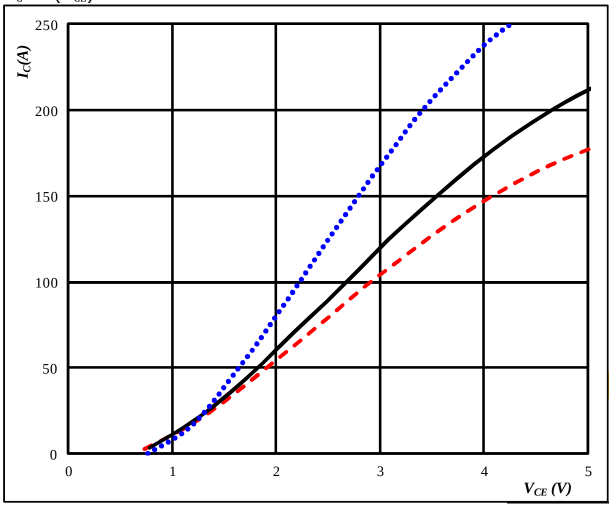
Thermistor

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R100=1486 Ω				100	-12		+12	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				25		3998		K
Vincotech NTC Reference									B	

Half Bridge Switch Characteristics

Typical output characteristics **IGBT**

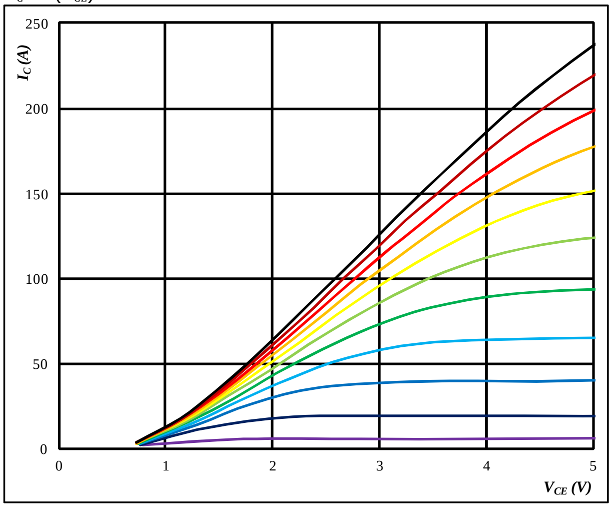
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

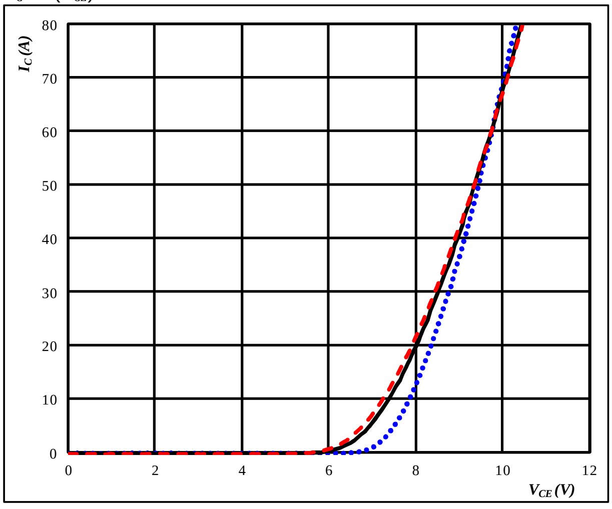
$I_C = f(V_{CE})$



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**

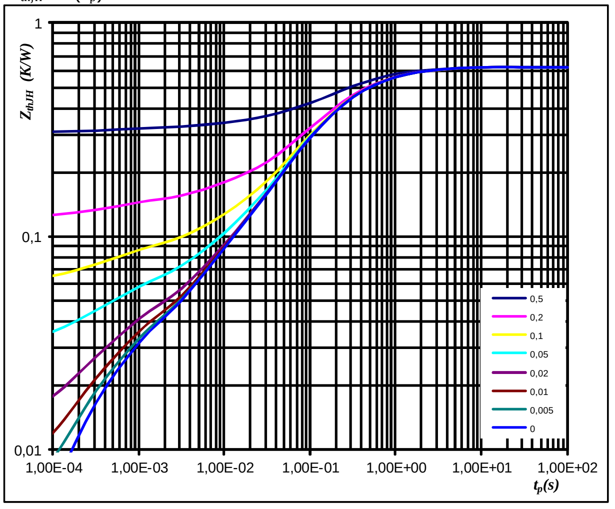
$I_C = f(V_{CE})$



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

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

$Z_{thJH} = f(t_p)$



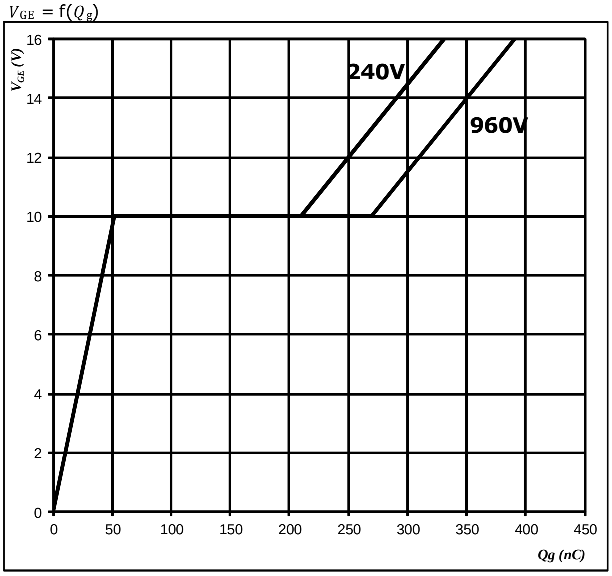
D = t_p / T
R_{thJH} = 0,6 K/W

IGBT thermal model values

R (K/W)	Tau (s)
1,00E-01	1,75E+00
3,00E-01	2,50E-01
1,60E-01	6,33E-02
3,61E-02	6,32E-03
2,47E-02	3,87E-04

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_g)$

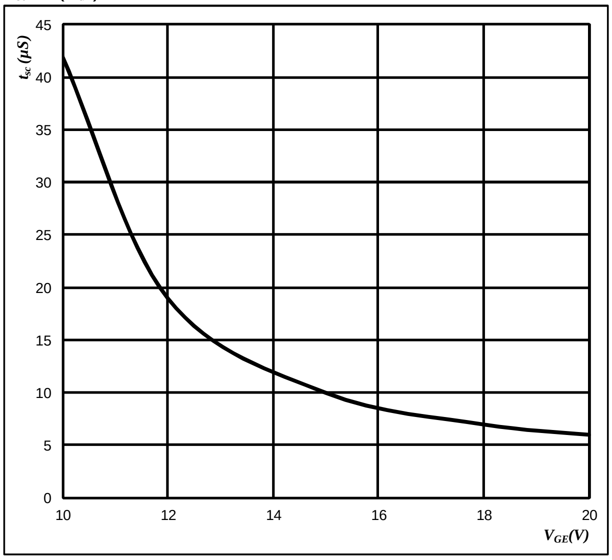


At

I_C=	80	A

Short circuit withstand time as a function of V_{GE} IGBT

$t_{sc} = f(V_{GE})$

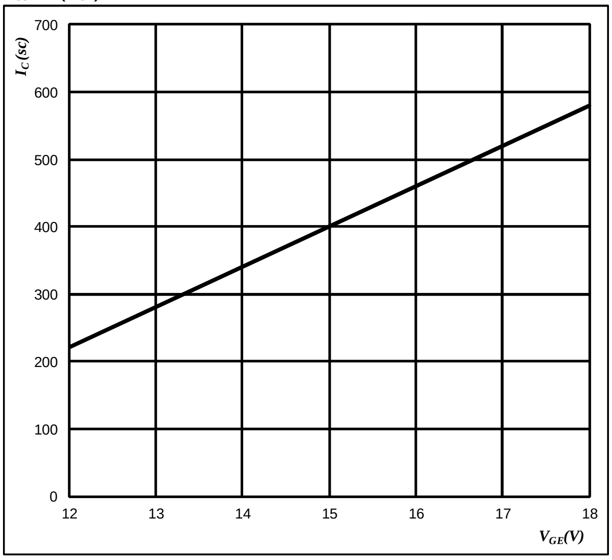


At

V_{CE} =	600	V
T_j ≤	150	ºC

Typical short circuit collector current as a function of V_{GE} IGBT

$I_{SC} = f(V_{GE})$



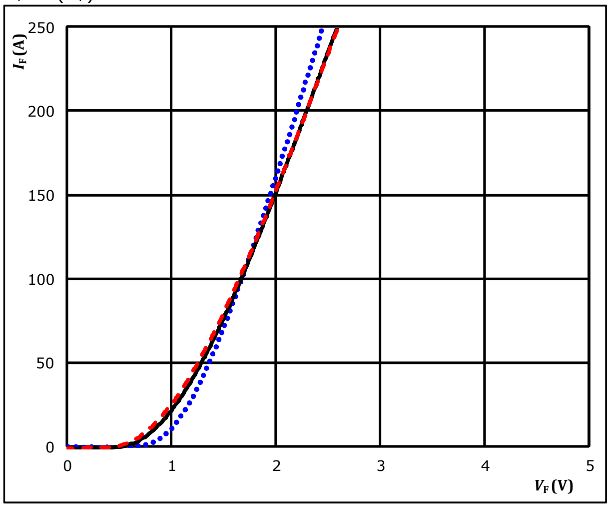
At

V_{CE} ≤	600	V
T_j ≤	25	ºC

Neutral Point Diode Characteristics

Typical forward characteristics — **FWD**

$I_F = f(V_F)$

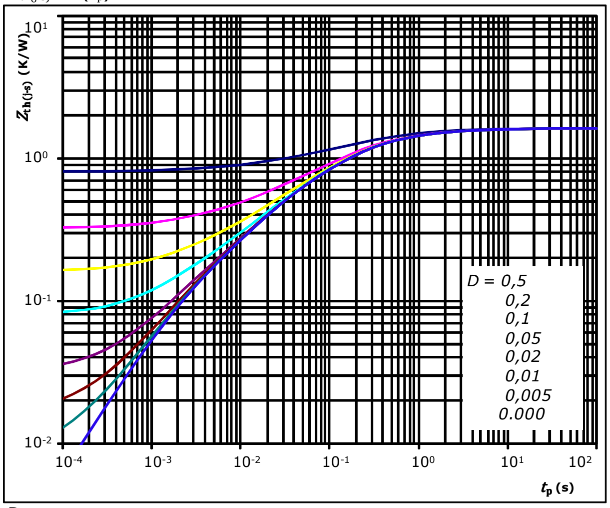


t_p = 250 µs

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

$R_{th(j-s)}$ = 1,61 K/W

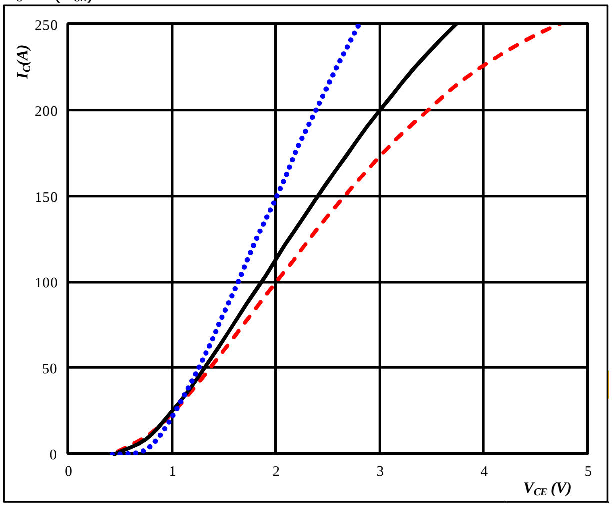
FWD thermal model values

R (K/W)	τ (s)
9,80E-02	5,80E+00
3,03E-01	8,55E-01
6,51E-01	1,83E-01
3,18E-01	4,73E-02
1,83E-01	1,14E-02
5,88E-02	1,69E-03

Neutral Point Switch Characteristics

Typical output characteristics **IGBT**

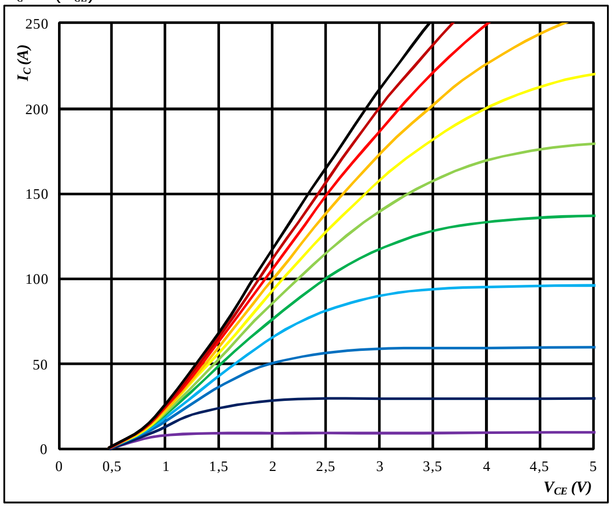
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

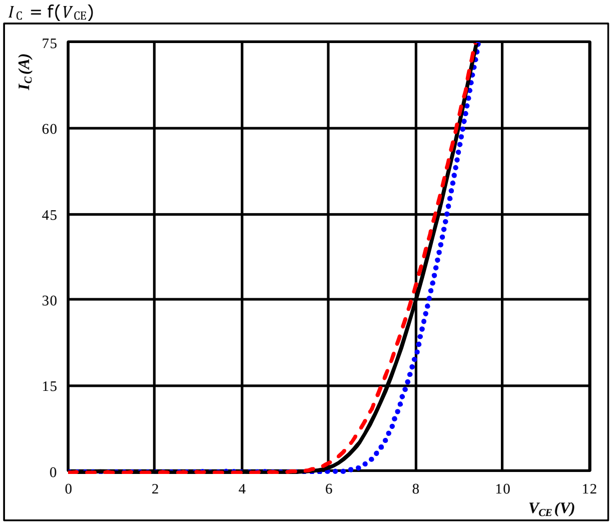
$I_C = f(V_{CE})$



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**

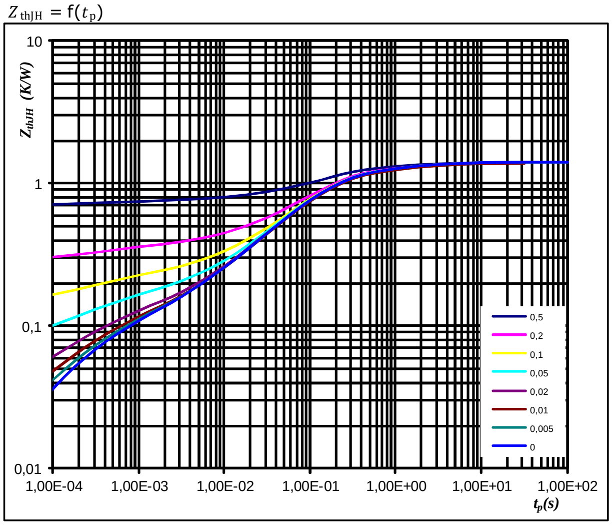
$I_C = f(V_{CE})$



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

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

$Z_{thJH} = f(t_p)$



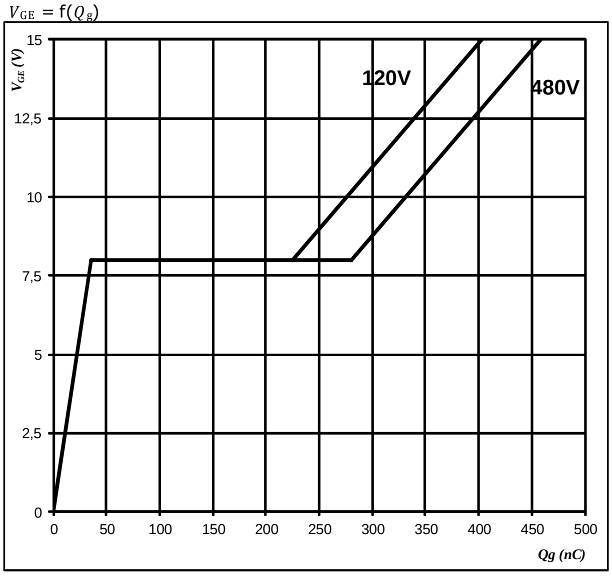
D = t_p / T
R_{thJH} = 1,40 K/W

IGBT thermal model values

R (K/W)	Tau (s)
8,57E-02	4,79E+00
2,12E-01	8,67E-01
6,54E-01	1,48E-01
2,51E-01	4,86E-02
9,58E-02	9,17E-03
6,26E-02	6,32E-04

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_g)$

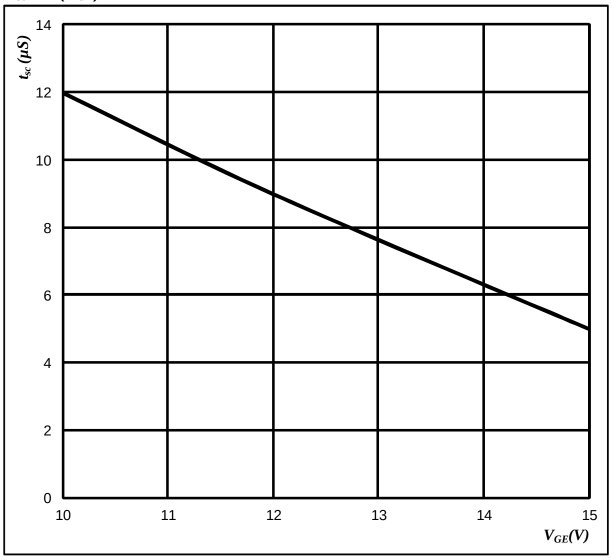


At

$I_C =$ 75 A

Short circuit withstand time as a function of V_{GE} IGBT

$t_{sc} = f(V_{GE})$



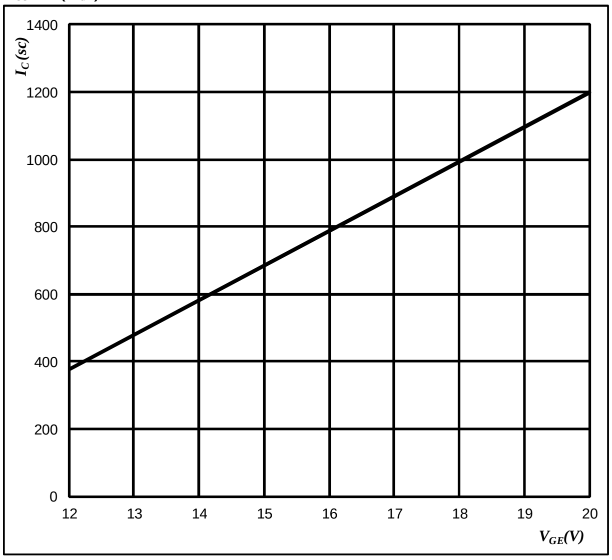
At

V_{CE} = 600 V

$T_j \leq$ 175 ºC

Typical short circuit collector current as a function of V_{GE} IGBT

$I_{SC} = f(V_{GE})$



At

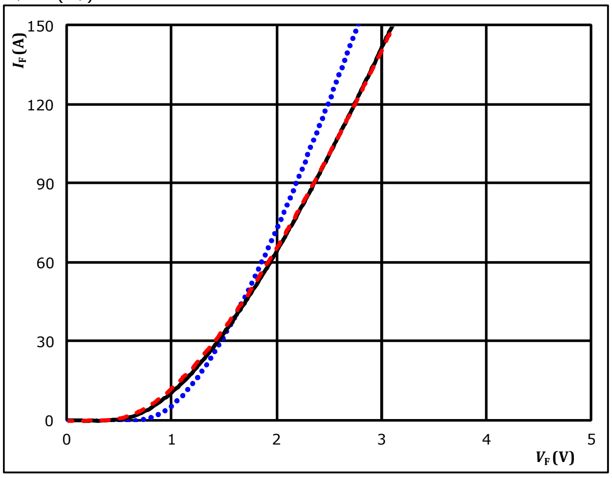
$V_{CE} \leq$ 600 V

$T_j \leq$ 175 ºC

Half Bridge Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

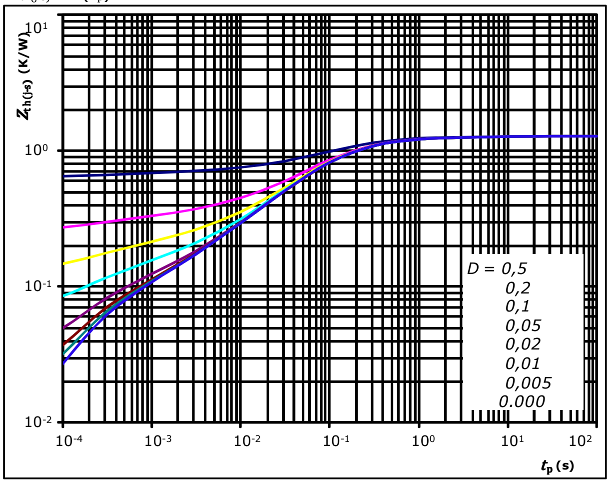


t_p = 250 μs

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

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

FWD thermal model values

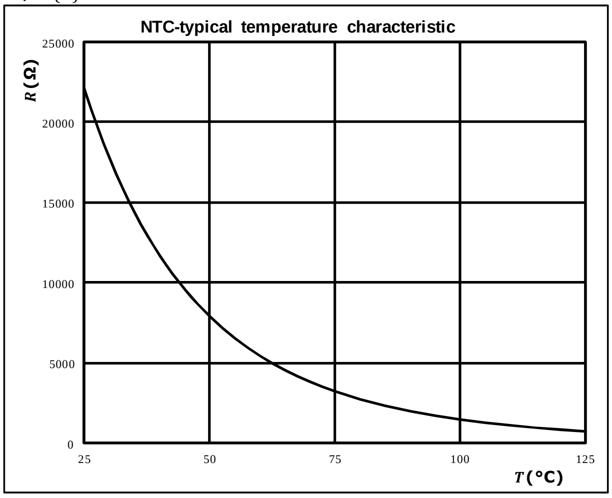
R (K/W)	τ (s)
7,18E-02	3,30E+00
3,55E-01	2,92E-01
6,00E-01	6,90E-02
1,46E-01	1,13E-02
5,33E-02	1,66E-03
6,20E-02	2,38E-04

Thermistor

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

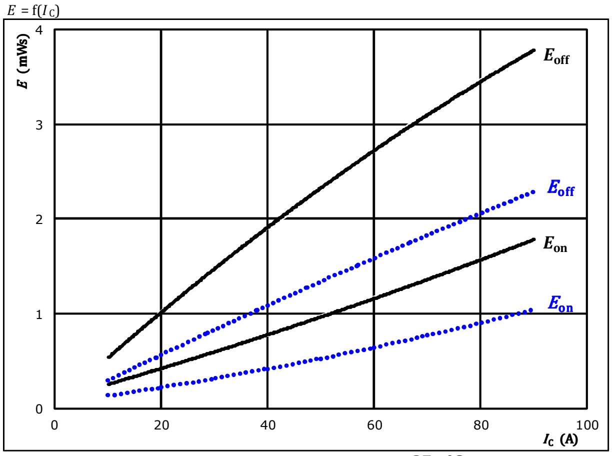


Half Bridge Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



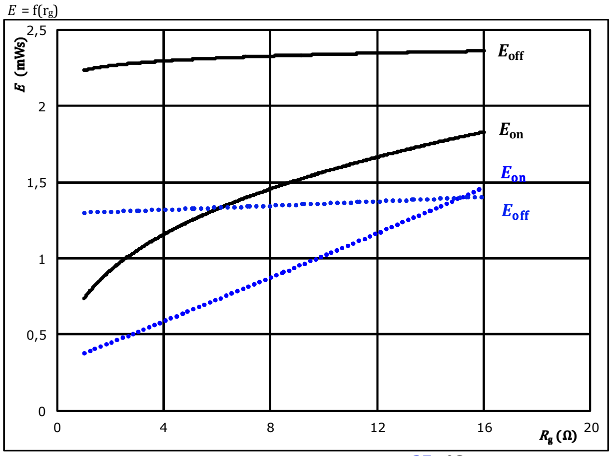
With an inductive load at

V_{CE} =	350	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

$E = f(r_g)$



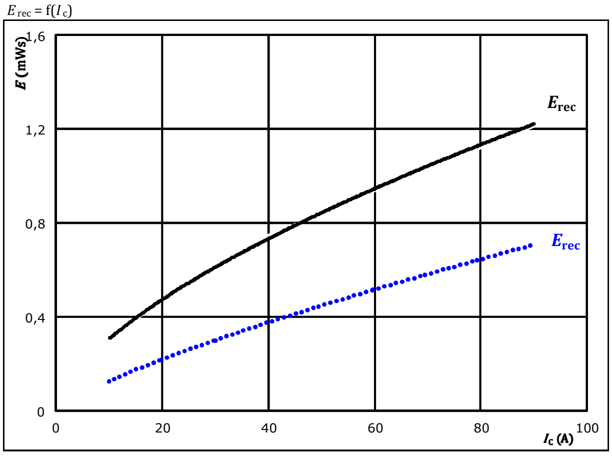
With an inductive load at

V_{CE} =	350	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

$E_{rec} = f(I_c)$



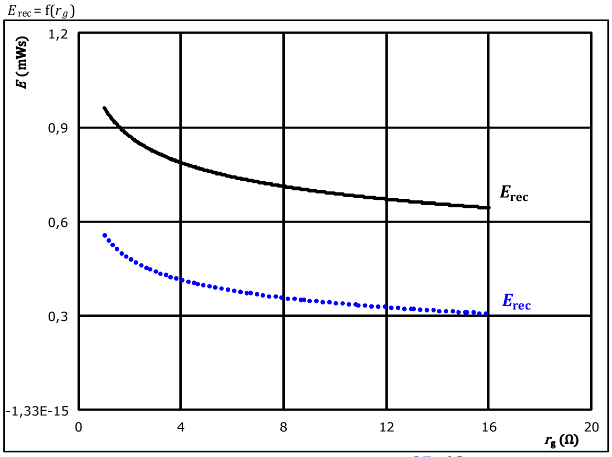
With an inductive load at

V_{CE} =	350	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

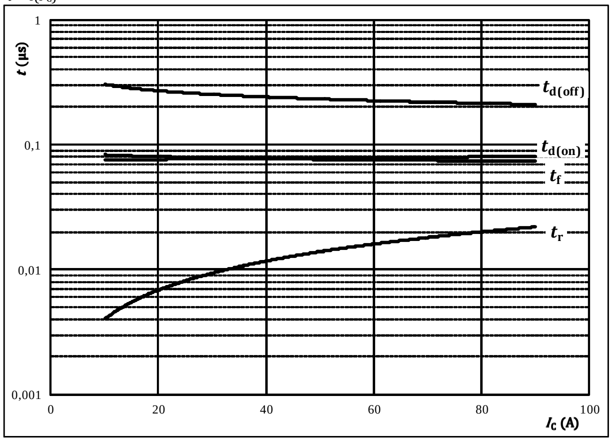
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	±15	V		125 °C	———
I_C =	50	A		150 °C	– – – –

Half Bridge Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



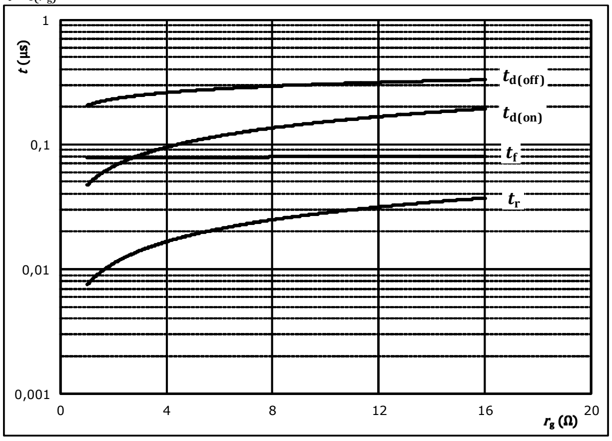
With an inductive load at

T_j =	125	°C
V_{CE} =	350	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

$t = f(r_g)$



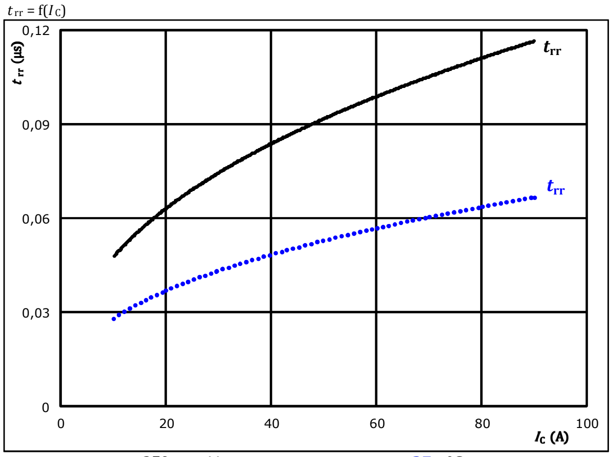
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	50	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

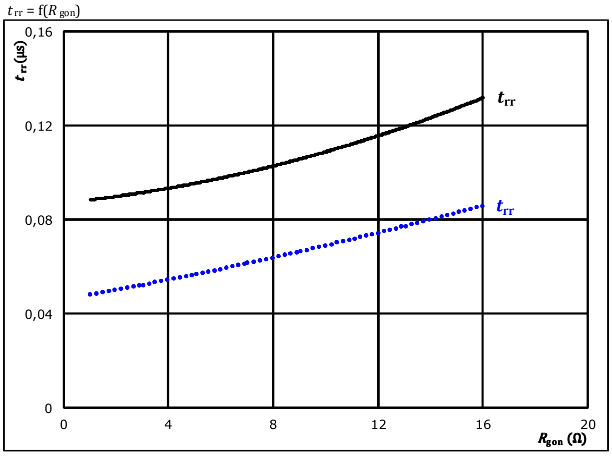


At V_{CE}=	350	V		**25 °C**	
V_{GE} =	±15	V	T_j:	**125 °C**	
R_{gon} =	4	Ω		**150 °C**	

Figure 8. **FWD**

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

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



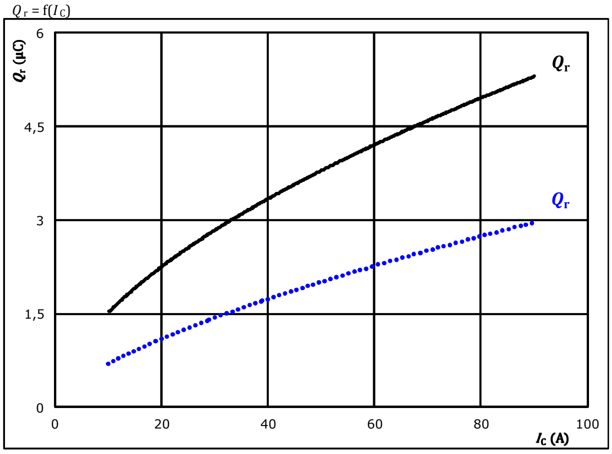
At V_{CE} =	350	V		**25 °C**	
V_{GE} =	±15	V	T_j:	**125 °C**	
I_C =	50	A		**150 °C**	

Half Bridge Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

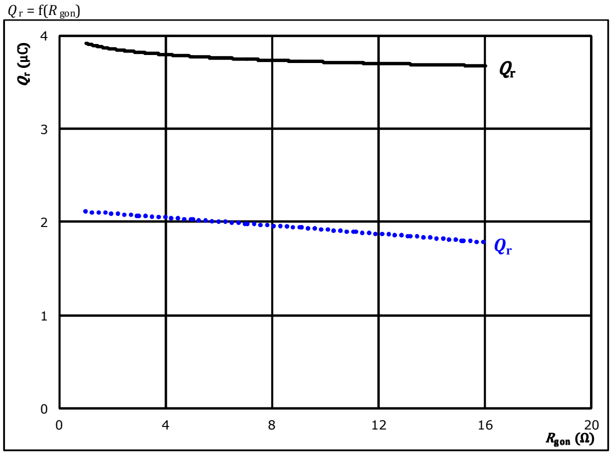


At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

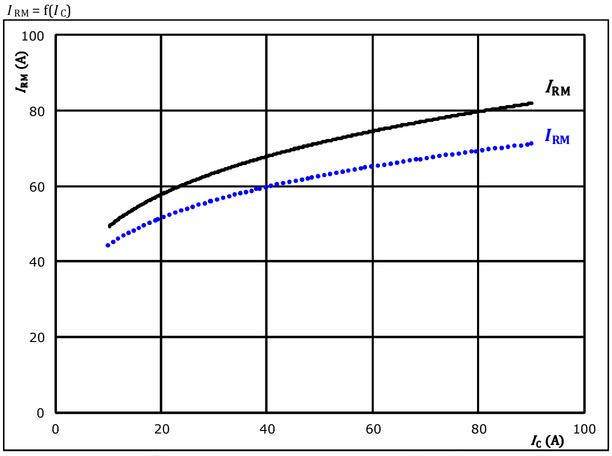


At					
V_{CE}=	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	50	A		150 °C	– – – –

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

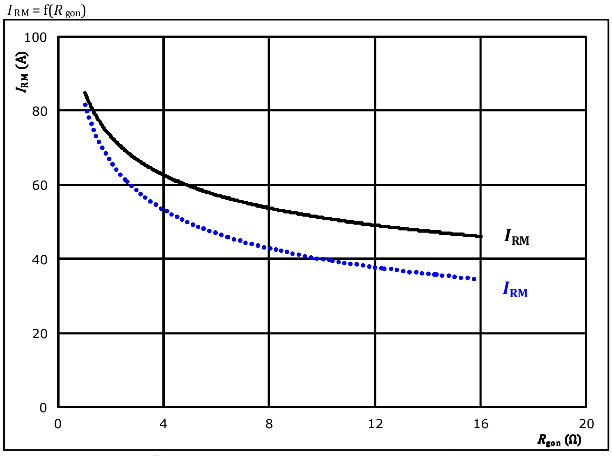


At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

Figure 12. **FWD**

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

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



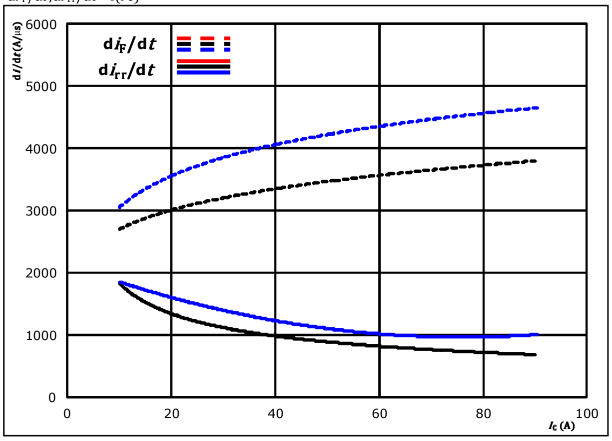
At					
V_{CE} =	350	V		25 °C	·············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	50	A		150 °C	– – – –

Half Bridge Switching Characteristics

Figure 13. **FWD**

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

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

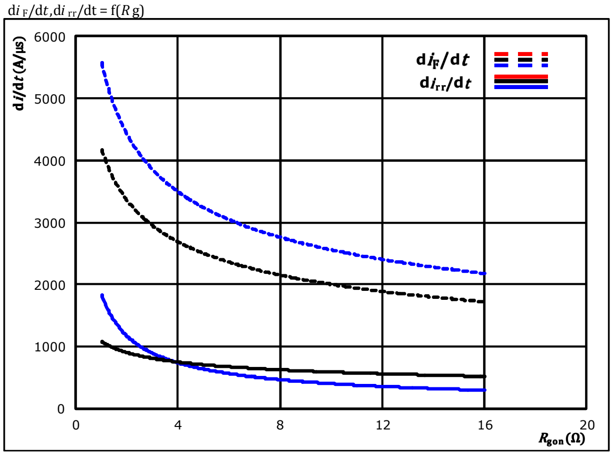


At					
V_{CE} =	350	V		25 °C	
V_{GE} =	±15	V	T_j:	125 °C	
R_{gon} =	4	Ω		150 °C	

Figure 14. **FWD**

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

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

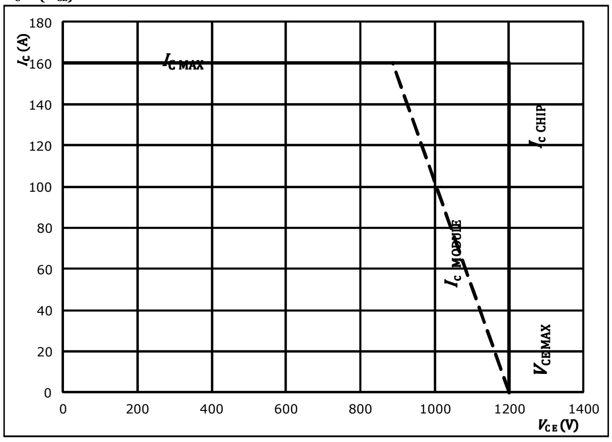


At		
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	50	A

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

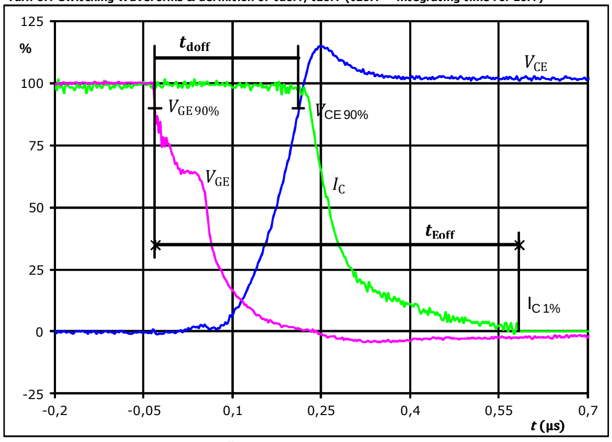
Half Bridge Switching Characteristics

General conditions

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

Figure 1. IGBT

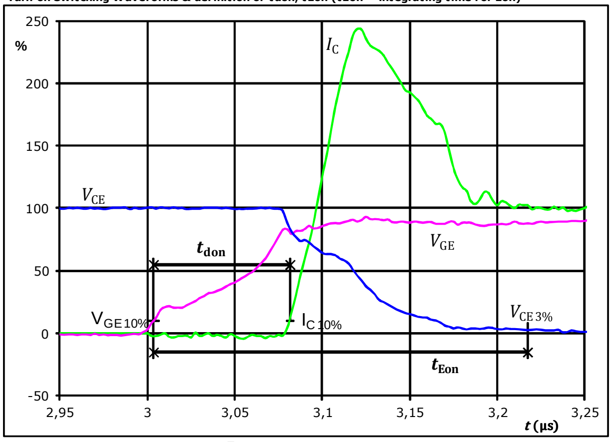
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	700	V
I_C (100%) =	50	A
t_{doff} =	0,242	µs
t_{Eoff} =	0,615	µs

Figure 2. IGBT

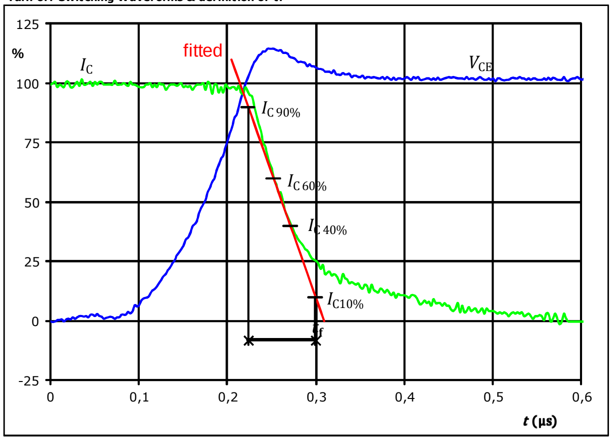
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	700	V
I_C (100%) =	50	A
t_{don} =	0,079	µs
t_{Eon} =	0,214	µs

Figure 3. IGBT

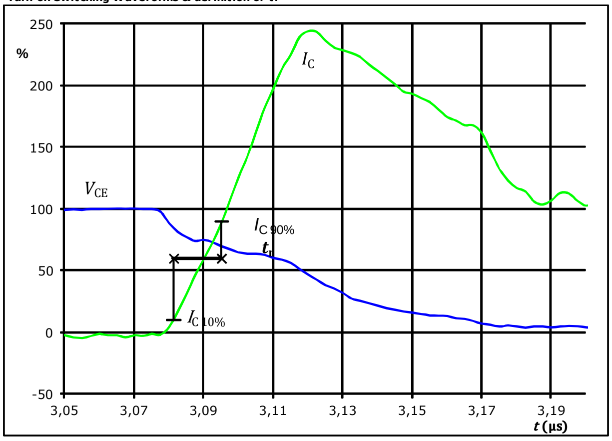
Turn-off Switching Waveforms & definition of tf



V_C (100%) =	700	V
I_C (100%) =	50	A
t_f =	0,076	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

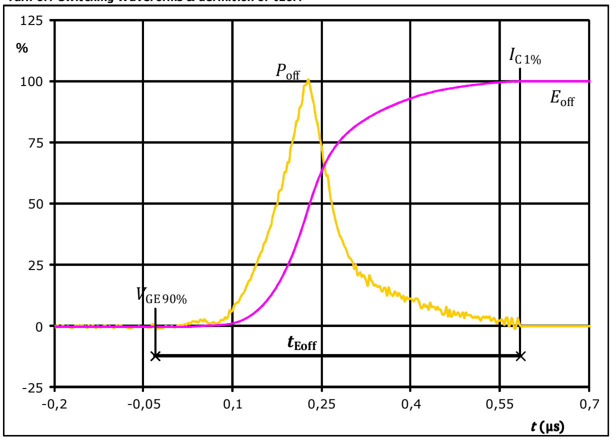


V_C (100%) =	700	V
I_C (100%) =	50	A
t_r =	0,014	µs

Half Bridge Switching Characteristics

Figure 5. **IGBT**

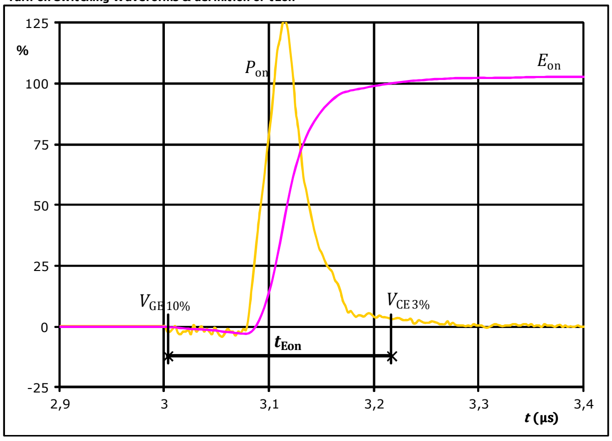
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	35,05	kW
E_{off} (100%) =	2,28	mJ
t_{Eoff} =	0,615	µs

Figure 6. **IGBT**

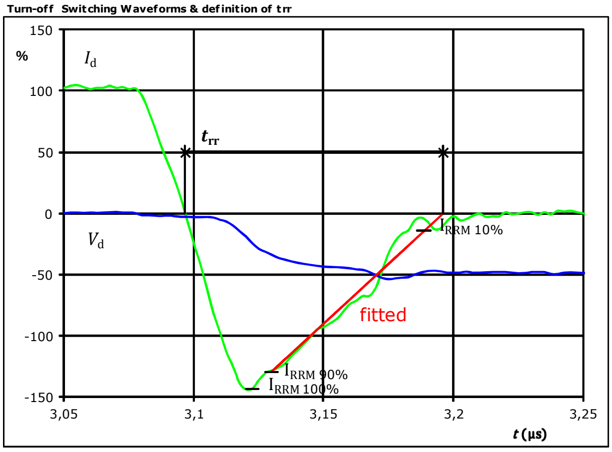
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	35,05	kW
E_{on} (100%) =	0,98	mJ
t_{Eon} =	0,214	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

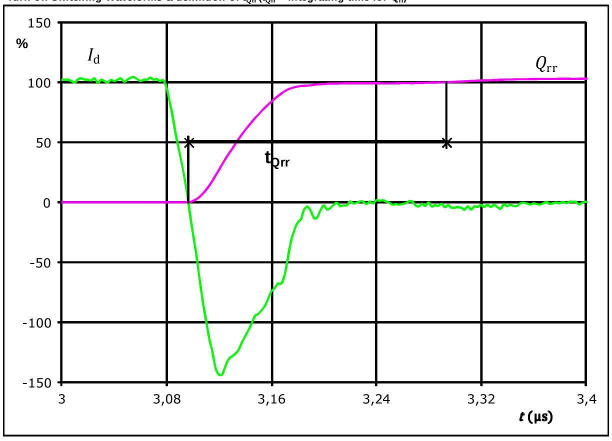


V_d (100%) =	700	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-73	A
t_{rr} =	0,092	µs

Half Bridge Switching Characteristics

Figure 8. **FWD**

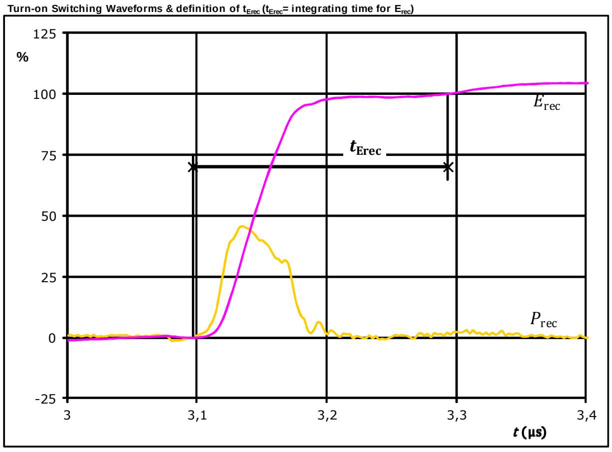
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	50	A
Q_{rr} (100%) =	3,80	µC
t_{Qrr} =	0,197	µs

Figure 9. **FWD**

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



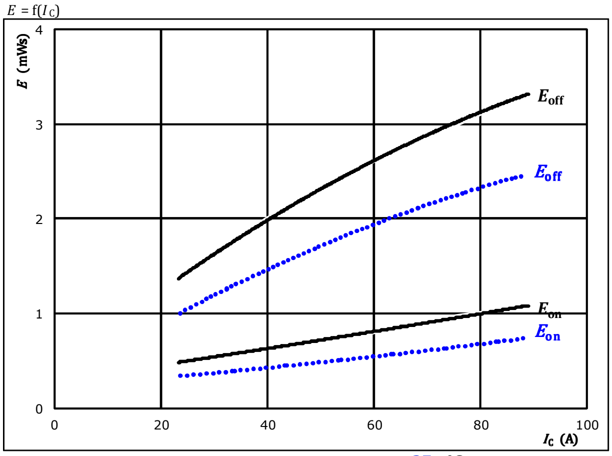
P_{rec} (100%) =	35,05	kW
E_{rec} (100%) =	0,85	mJ
t_{Erec} =	0,197	µs

Neutral Point Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



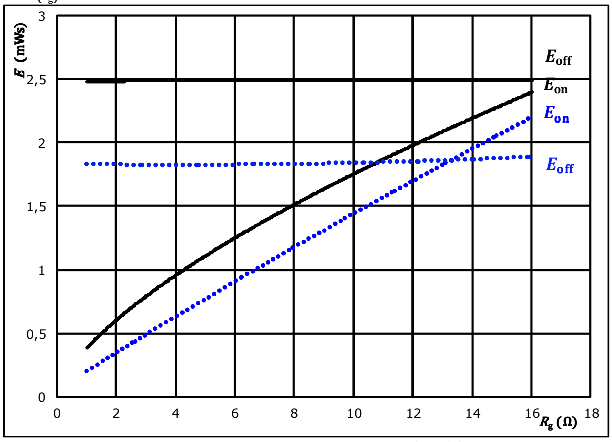
With an inductive load at

V_{CE} =	350	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

$E = f(r_g)$



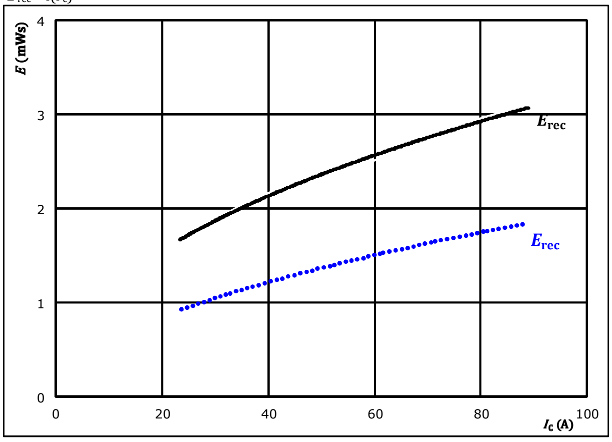
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	•••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C =	55	A		150 °C	– – – –

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



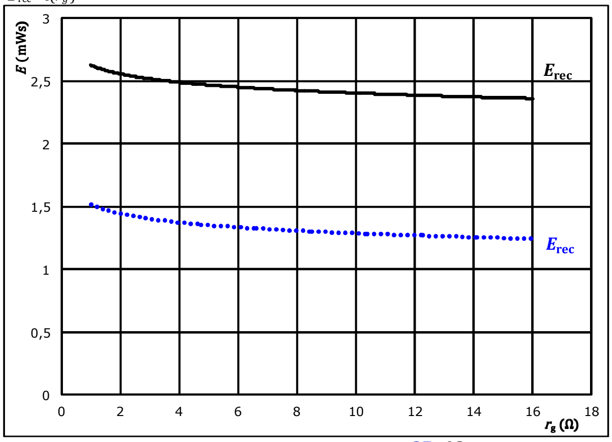
With an inductive load at

V_{CE} =	350	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

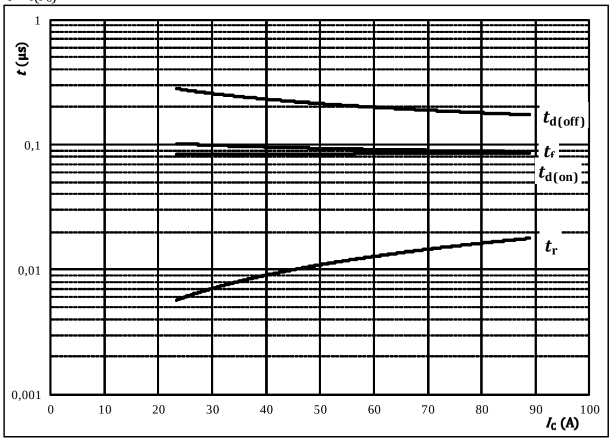
V_{CE} =	350	V	T_j:	25 °C	•••••••••••••
V_{GE} =	±15	V		125 °C	———
I_C =	55	A		150 °C	– – – –

Neutral Point Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



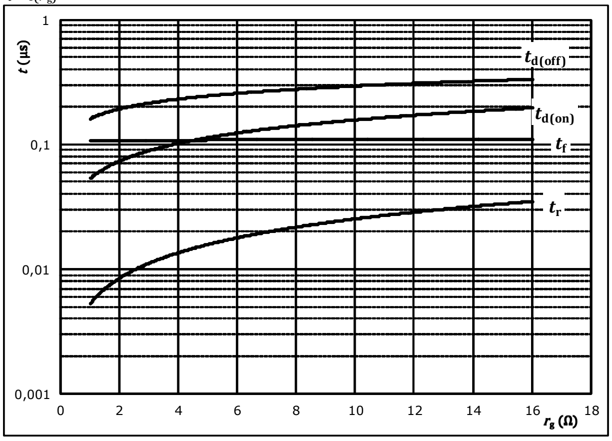
With an inductive load at

T_j =	125	°C
V_{CE} =	350	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

$t = f(r_g)$



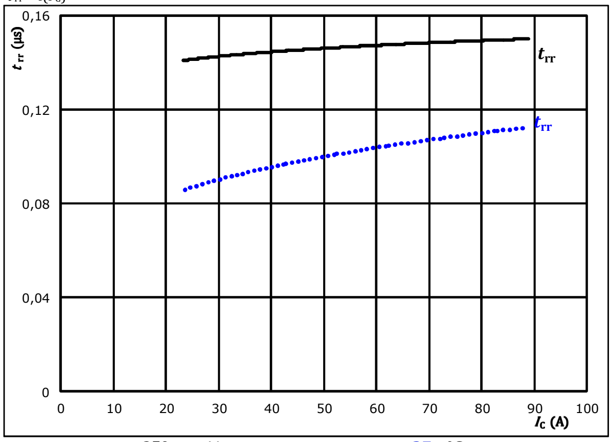
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	55	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

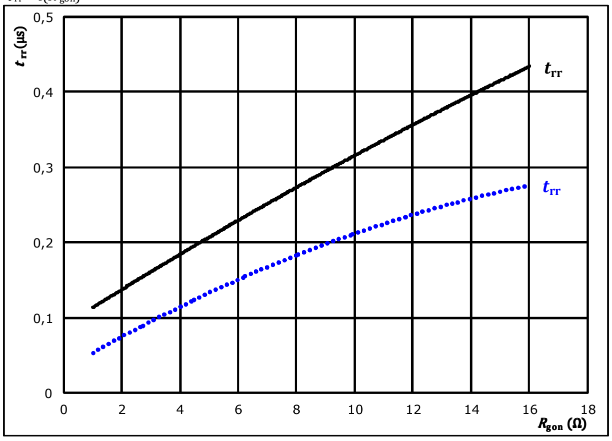


At					
V_{CE}=	350	V		25 °C	•••••••••••••
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	4	Ω		150 °C	— — — —

Figure 8. **FWD**

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

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



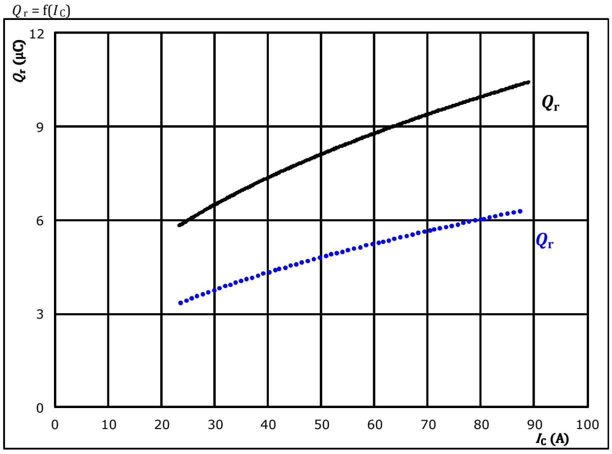
At					
V_{CE} =	350	V		25 °C	•••••••••••••
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	55	A		150 °C	— — — —

Neutral Point Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

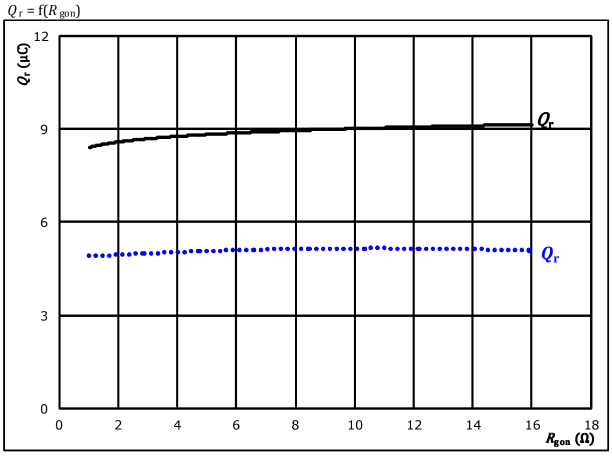


At				
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

Figure 10. FWD

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

$Q_r = f(R_{gon})$

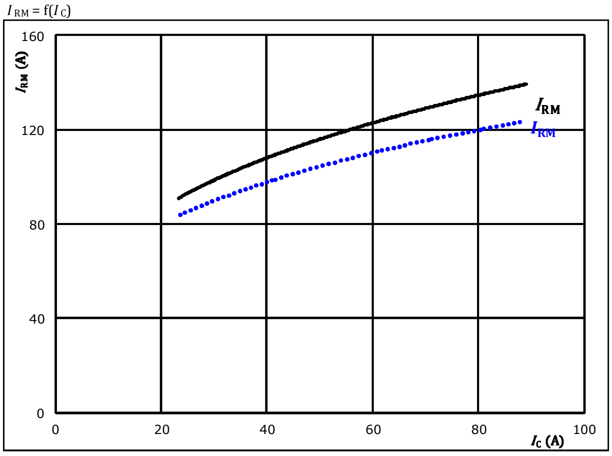


At				
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	55	A		150 °C

Figure 11. FWD

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

$I_{RM} = f(I_C)$

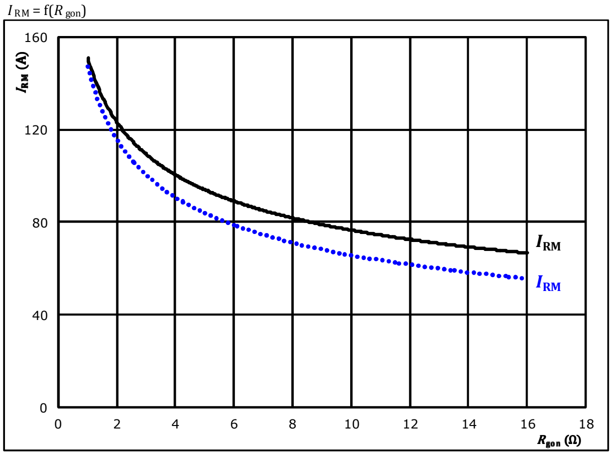


At				
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	Ω		150 °C

Figure 12. FWD

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

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



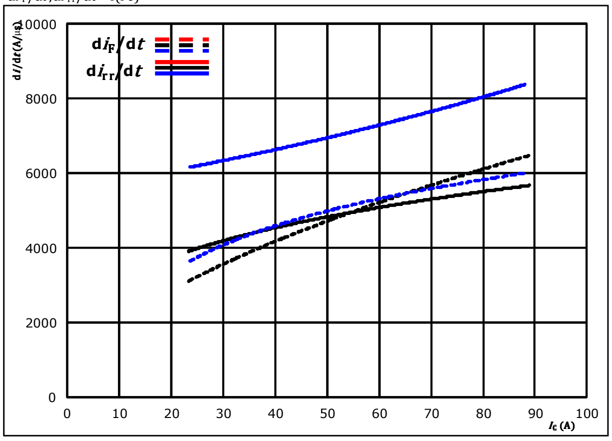
At				
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	55	A		150 °C

Neutral Point Switching Characteristics

Figure 13. **FWD**

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

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

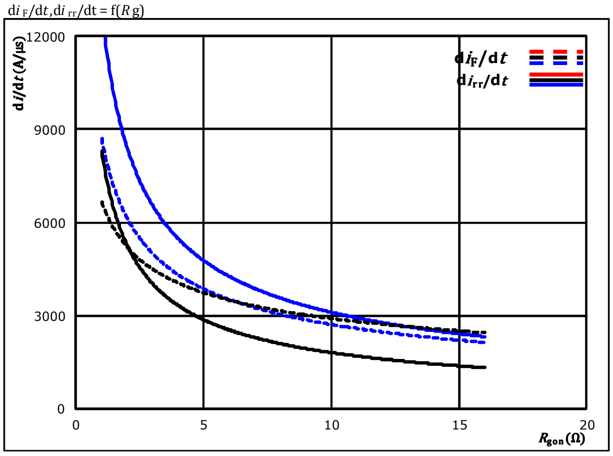


At					
V_{CE} =	350	V		25 °C	
V_{GE} =	±15	V	T_j:	125 °C	
R_{gon} =	4	Ω		150 °C	

Figure 14. **FWD**

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

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

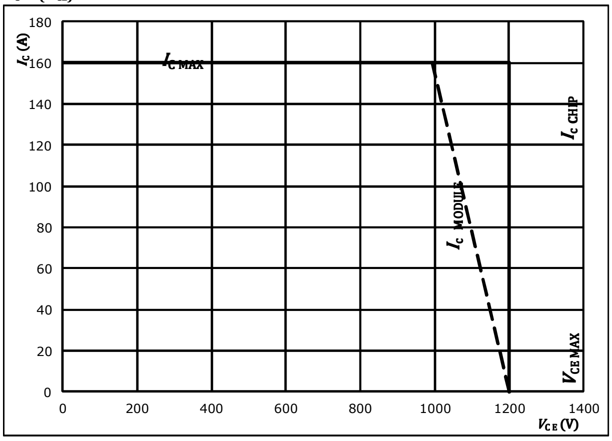


At		
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	55	A

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

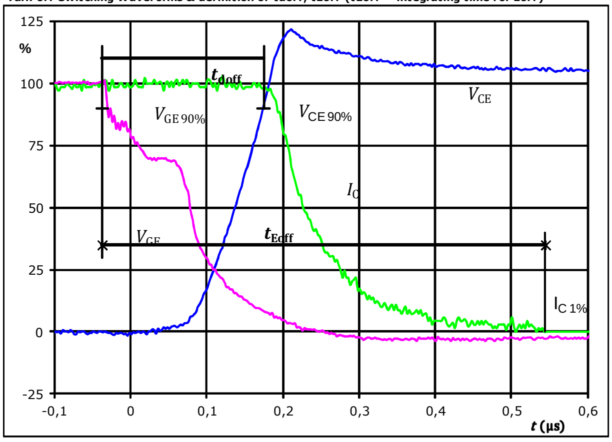
Neutral Point Switching Characteristics

General conditions

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

Figure 1. **IGBT**

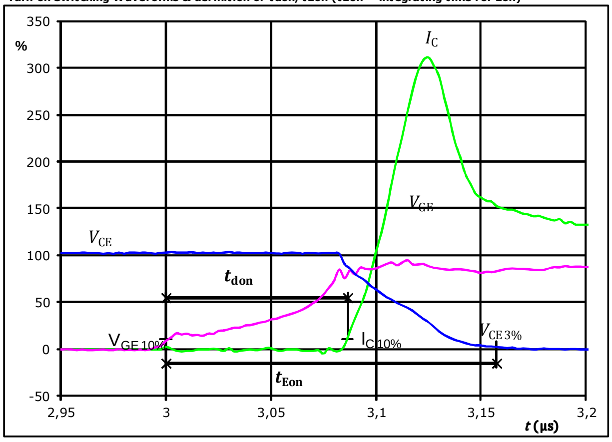
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{doff} =	0,205	µs
t_{Eoff} =	0,582	µs

Figure 2. **IGBT**

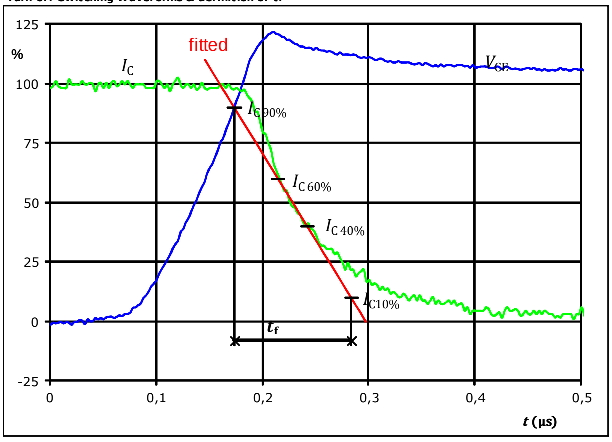
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_{don} =	0,085	µs
t_{Eon} =	0,157	µs

Figure 3. **IGBT**

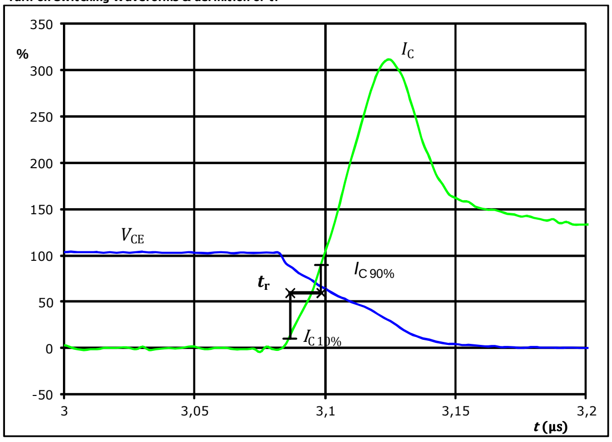
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_f =	0,105	µs

Figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

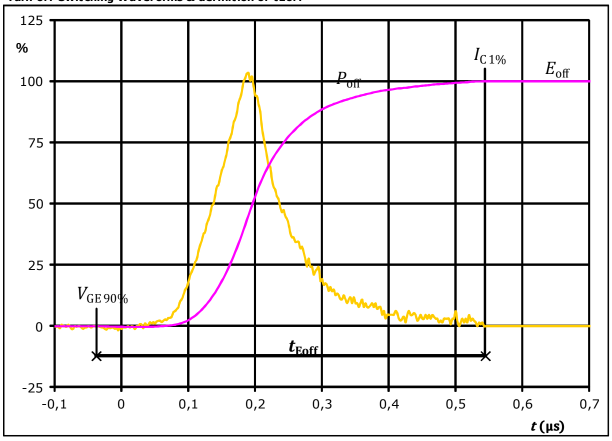


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	56	A
t_r =	0,012	µs

Neutral Point Switching Characteristics

Figure 5. **IGBT**

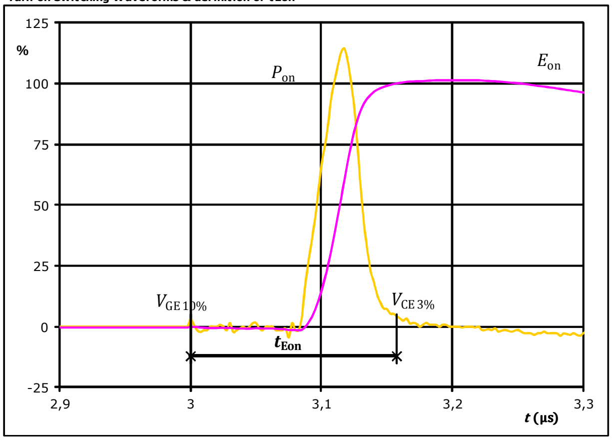
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	19,56	kW
E_{off} (100%) =	2,50	mJ
t_{Eoff} =	0,58	µs

Figure 6. **IGBT**

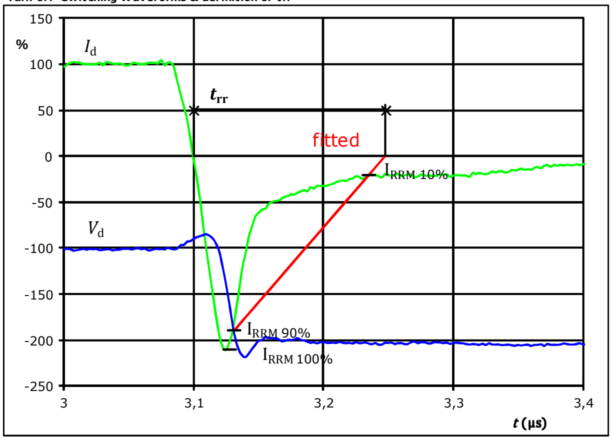
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	19,56	kW
E_{on} (100%) =	0,75	mJ
t_{Eon} =	0,16	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

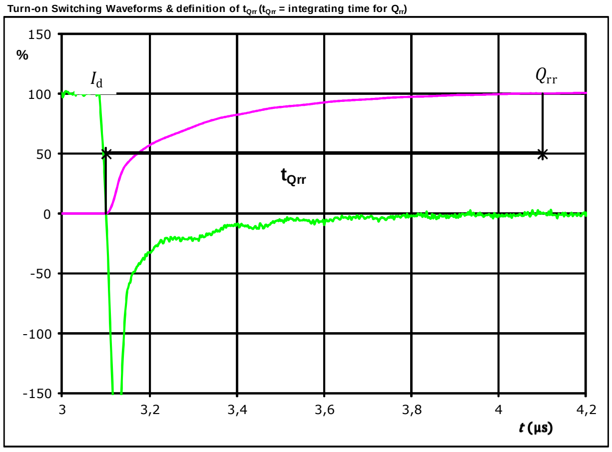


V_d (100%) =	350	V
I_d (100%) =	56	A
I_{RRM} (100%) =	-118	A
t_{rr} =	0,148	µs

Neutral Point Switching Characteristics

Figure 8. **FWD**

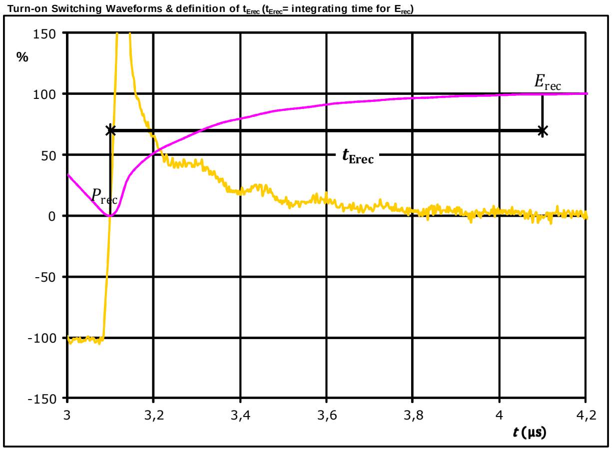
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	56	A
Q_{rr} (100%) =	8,22	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%) =	19,56	kW
E_{rec} (100%) =	2,42	mJ
t_{Erec} =	1,00	µs

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Ordering Code & Marking

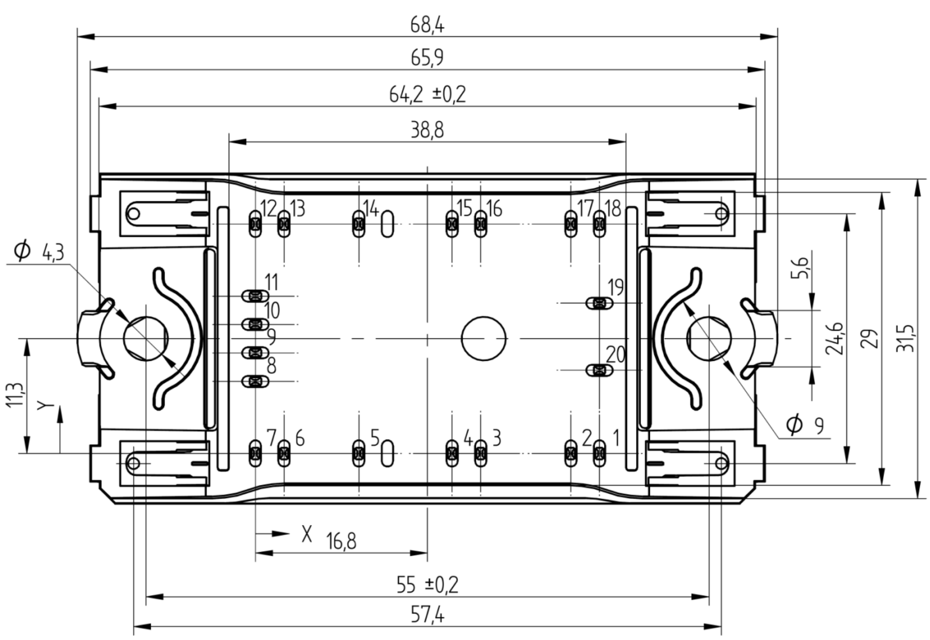
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste with Press-fit pins	10-PZ12NMA080SH23-M260F03Y	M260F03Y	M260F03Y

Text	**Vinco**	**Date code**	**Name&Ver**	**UL**	**Lot**	**Serial**
	Vinco	WWYY	NNNNNNNNVV	UL	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table

Pin	X	Y
1	33,6	0
2	30,8	0
3	22	0
4	19,2	0
5	10,1	0
6	2,8	0
7	0	0
8	0	7,1
9	0	9,9
10	0	12,7
11	0	15,5
12	0	22,6
13	2,8	22,6
14	10,1	22,6
15	19,2	22,6
16	22	22,6
17	30,8	22,6
18	33,6	22,6
19	33,6	14,8
20	33,6	8,2



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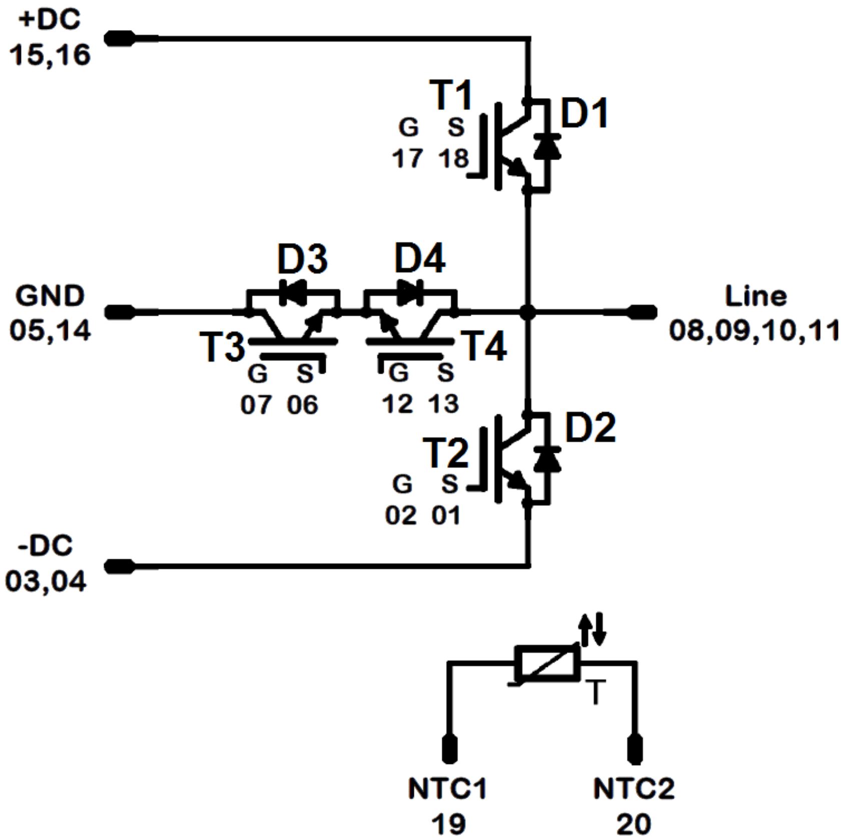
Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1,T2	IGBT	1200V	80A	Half Bridge Switch	
D1,D2	FWD	1200V	50A	Half Bridge Diode	
T3,T4	IGBT	600V	75A	Neutral Point Switch	
D3,D4	FWD	650V	75A	Neutral Point Diode	
T	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.

Document No.:	Date:	Modification:	Pages
10-PZ12NMA080SH23-M260F03Y-D1-14	1 Jul. 2015		

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.