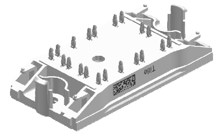
flow MNPC 0-SIC 1200V/ 80mΩ

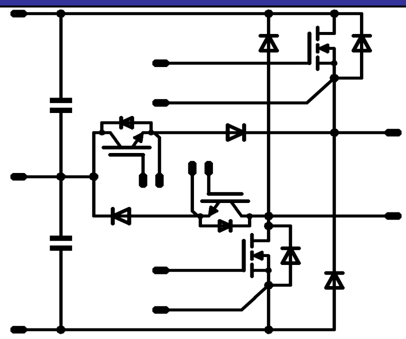
Features
- **Cree™** Silicon Carbide Power MOSFET
- **Cree™** Silicon Carbide Power Schottky Diode
- MNPC Topology with Splitted Output
- Ultra Low Inductance with Integrated DC-capacitors
- Extremely Fast Switching with No "Tail" Current
- Unsensitivity for Cross Through Conduction
- Solderless Press-fit Mounting Technology
- Temperature sensor

flow 0 12mm housing



Target Applications
- High efficient solar inverters
- UPS

Schematic



Types
- 10-PZ12NMA027ME-M340F63Y

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Half Bridge MOSFET (T1 , T4)				
Drain-source break down voltage	V_{DSS}		1200	V
DC drain current	I_D	$T_j=T_j$max T_h=80℃	50	A
Repetitive peak drain current	I_{Dpulse}	t_p limited by $T_j$max	180	A
Power dissipation per IGBT	P_{tot}	$T_j=T_j$max T_h=80℃	98	W
Gate-source peak voltage	V_{GS}		-10/+25	V
Maximum Junction Temperature	$T_j$max		150	℃
Neutral Point FWD (D7 , D8)				
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25℃	650	V
DC forward current	I_F	$T_j=T_j$max T_h=80℃	27	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	171	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max T_h=80℃	58	W
Maximum Junction Temperature	$T_j$max		175	℃

Maximum Ratings

Tj=25℃, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Neutral Point IGBT (T2 , T3)					
Collector-emitter break down voltage	V_{CE}			650	V
DC collector current	I_C	$T_j=T_jmax$	T_h=80℃	60	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by T_jmax		240	A
Power dissipation per IGBT	P_{tot}	$T_j=T_jmax$	T_h=80℃	99	W
Gate-emitter peak voltage	V_{GE}			±20	V
Maximum Junction Temperature	T_jmax			175	℃
Neutral Point Inv. Diode (D2 , D3)					
Peak Repetitive Reverse Voltage	V_{RRM}	T_c=25℃		650	V
DC forward current	I_F	$T_j=T_jmax$	T_h=80℃	13	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_jmax		12	A
Power dissipation per Diode	P_{tot}	$T_j=T_jmax$	T_h=80℃	27	W
Maximum Junction Temperature	T_jmax			175	℃
Half Bridge FWD (D5 , D6)					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25℃		1200	V
DC forward current	I_F	$T_j=T_jmax$	T_h=80℃	16	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_jmax		47	A
Power dissipation per Diode	P_{tot}	$T_j=T_jmax$	T_h=80℃	40	W
Maximum Junction Temperature	T_jmax			175	℃
DC link Capacitor (C1 , C2)					
Max.DC voltage	V_{MAX}		Tc=25℃	500	V
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	℃
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	℃
Insulation Properties					
Insulation voltage	V_{is}	t=2s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 9,17	mm
Comparative tracking index	CTI			>200	

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Half Bridge MOSFET (T1 , T4)										
Drain-source on-state resistance	$R_{ds(on)}$		20		20	Tj=25℃ Tj=150℃		80 150		mΩ
Gate threshold voltage	$V_{(GS)th}$	V_{DS}=V_{GS}			0,003	Tj=25℃ Tj=125℃	1,7	3,62 4,97		V
Total Gate Reverse Leakage	I_{GSS}		20	0		Tj=25℃ Tj=25℃			0,75	µA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		Tj=25℃ Tj=125℃			300 750	µA
Turn-on delay time	$t_{d(on)}$	Rgoff=4 Ω Rgon=4 Ω	+16/-5	350	44	Tj=25℃ Tj=125℃		24 22		ns
Rise time	t_r					Tj=25℃ Tj=125℃		8 7		
Turn-off delay time	$t_{d(off)}$					Tj=25℃ Tj=125℃		63 68		
Fall time	t_f					Tj=25℃ Tj=125℃		17 13		
Turn-on energy loss per pulse	E_{on}					Tj=25℃ Tj=125℃		0,13 0,11		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25℃ Tj=125℃		0,09 0,08		
Total gate charge *	Q_g		0/20	800	60	Tj=25℃		148		pF
Gate to source charge	Q_{gs}							32		pF
Gate to drain charge	Q_{gd}							54		pF
Input capacitance *	C_{ies}	f=1MHz	0	1000		Tj=25℃		2850		pF
Output capacitance	C_{oss}							240		
Reverse transfer capacitance	C_{rss}							19,5		
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						0,71		K/W
Neutral Point FWD (D7 , D8)										
Diode forward voltage	V_F				24	Tj=25℃ Tj=125℃		1,52 1,82	1,8	V
Peak reverse recovery current	I_{RRM}	Rgon=4 Ω	+16/-5	350	44	Tj=25℃ Tj=125℃		40 44		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		12 12		ns
Reverse recovered charge	Q_{rr}					Tj=25℃ Tj=125℃		0,20 0,18		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=125℃		10399 10851		A/µs
Reverse recovered energy	Erec					Tj=25℃ Tj=125℃		0,03 0,02		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						1,63		K/W

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
Neutral Point IGBT (T2 , T3)										
Gate emitter threshold voltage	$V_{GE(th)}$	V_{CE}=V_{GE}			0,0008	Tj=25℃ Tj=125℃	3,3	4,0	4,7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		80	Tj=25℃ Tj=125℃	1	1,66 1,79	2,3	V
Collector-emitter cut-off incl diode	I_{CES}		0	650		Tj=25℃ Tj=125℃			0,5	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25℃ Tj=125℃			200	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=2 Ω Rgon=2 Ω	±15	350	44	Tj=25℃ Tj=125℃		43 45		ns
Rise time	t_r					Tj=25℃ Tj=125℃		4 5		
Turn-off delay time	$t_{d(off)}$					Tj=25℃ Tj=125℃		70 90		
Fall time	t_f					Tj=25℃ Tj=125℃		11 11		
Turn-on energy loss per pulse	E_{on}					Tj=25℃ Tj=125℃		0,18 0,27		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25℃ Tj=125℃		0,17 0,30		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25℃		5000		pF
Output capacitance	C_{oss}							80		
Reverse transfer capacitance	C_{rss}							18		
Gate charge	Q_{Gate}		15	520	80	Tj=25℃		190		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						0,96		K/W
Neutral Point Inv. Diode (D2 , D3)										
Diode forward voltage	V_F				6	Tj=25℃ Tj=125℃	1,2	1,58 1,50	2,1	V
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						3,52		K/W
Half Bridge FWD (D5 , D6)										
Diode forward voltage	V_F				10	Tj=25℃ Tj=125℃		1,49 1,78	1,8	V
Reverse leakage current	I_r			1200		Tj=25℃ Tj=125℃			250	μA
Peak reverse recovery current	I_{RRM}	Rgon=2 Ω	±15	350	44	Tj=25℃ Tj=125℃		34 44		A
Reverse recovery time	t_{rr}					Tj=25℃ Tj=125℃		21 27		ns
Reverse recovered charge	Q_{rr}					Tj=25℃ Tj=125℃		0,41 0,59		μC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25℃ Tj=125℃		910 9169		A/μs
Reverse recovery energy	E_{rec}					Tj=25℃ Tj=125℃		0,07 0,09		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material						2,39		K/W
DC link Capacitor (C1 , C2)										
C value	C							270		nF
Thermistor										
Rated resistance	R					Tj=25℃		22000		Ω
Deviation of R100	ΔR/R	R100=1486 Ω				Tc=100℃	-5		+5	%
Power dissipation	P					Tj=25℃		200		mW
Power dissipation constant						Tj=25℃		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25℃		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25℃		3996		K
Vincotech NTC Reference									B	

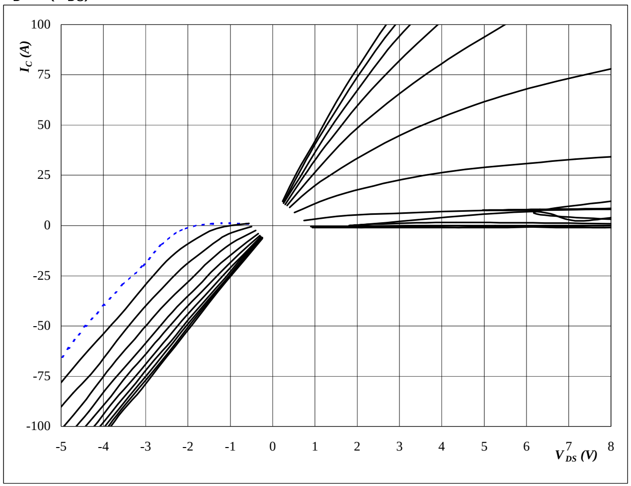
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 1 MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



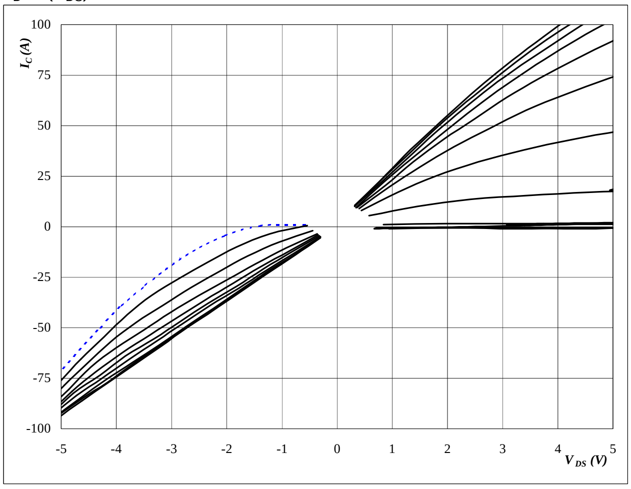
At

t_p =	250	μs
T_j =	25	℃
V_{GS} from	-6 V to 20 V in steps of 2 V	

Figure 2 MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



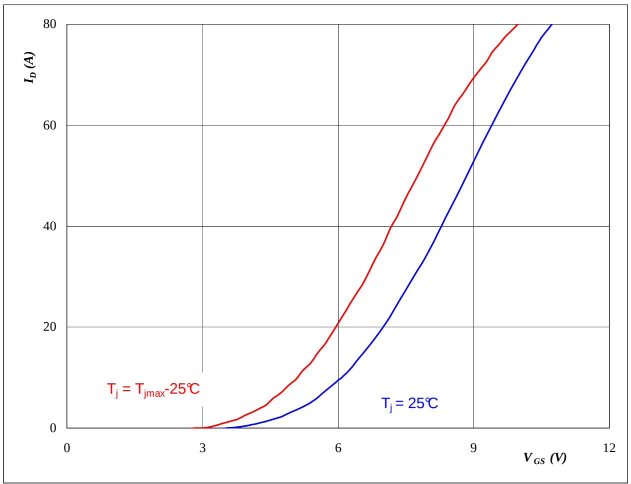
At

t_p =	250	μs
T_j =	125	℃
V_{GS} from	-6 V to 20 V in steps of 2 V	

Figure 3 MOSFET

Typical transfer characteristics

$I_D = f(V_{GE})$



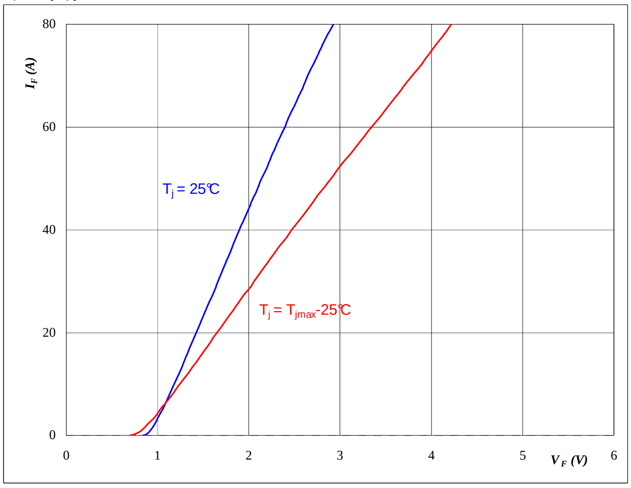
At

t_p =	250	μs
V_{DS} =	10	V

Figure 4 FWD

Typical FWD forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p =	250	μs

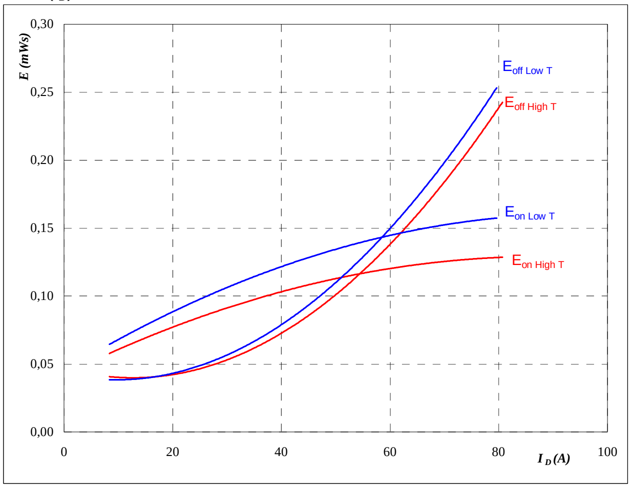
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 5 MOSFET

Typical switching energy losses
as a function of drain current

E = f(I_D)



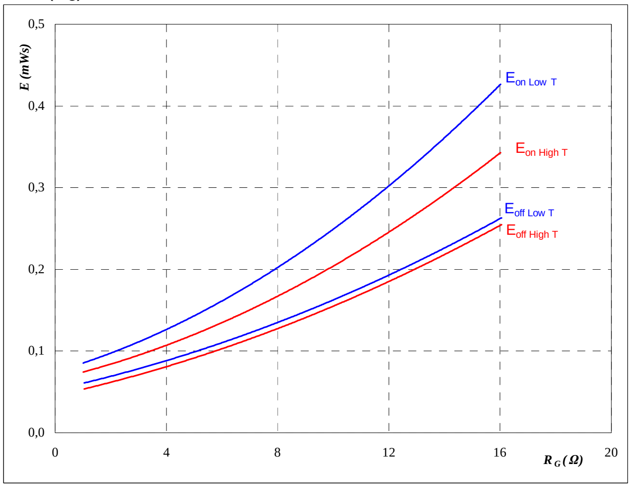
With an inductive load at

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6 MOSFET

Typical switching energy losses
as a function of gate resistor

E = f(R_G)



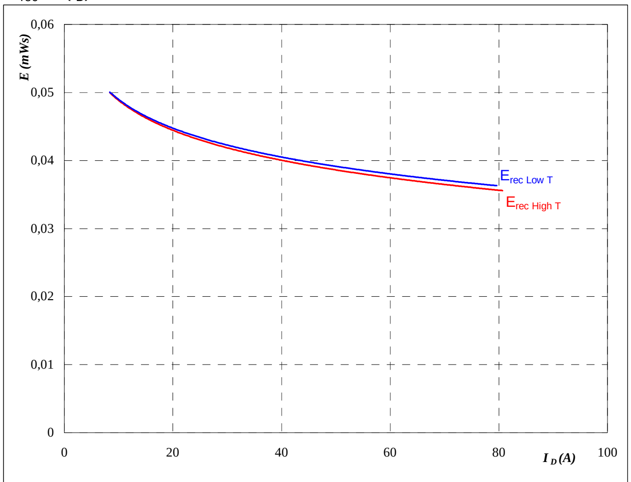
With an inductive load at

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
I_D =	44	A

Figure 7 FWD

Typical reverse recovery energy loss
as a function of drain current

E_{rec} = f(I_D)



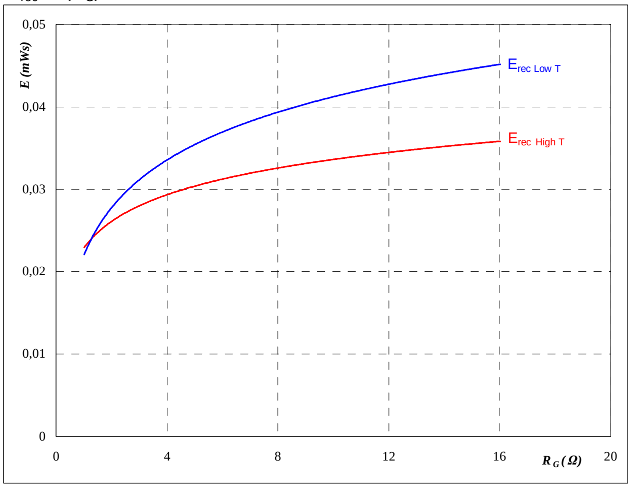
With an inductive load at

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω

Figure 8 FWD

Typical reverse recovery energy loss
as a function of gate resistor

E_{rec} = f(R_G)



With an inductive load at

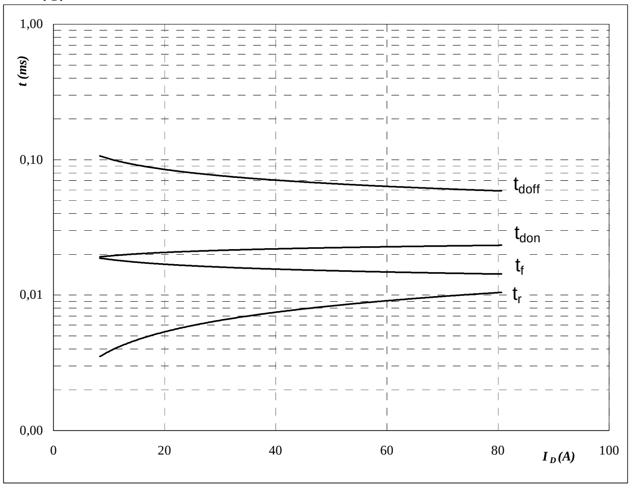
T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
I_D =	44	A

Half Bridge

Figure 9 MOSFET

Typical switching times as a function of drain current

$t = f(I_D)$



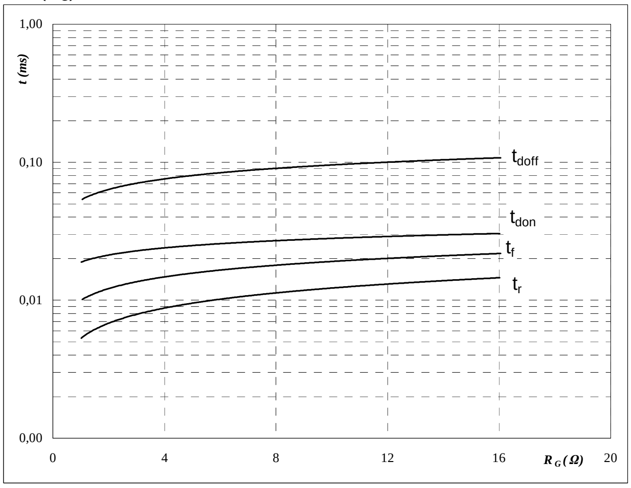
With an inductive load at

T_j =	125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 10 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



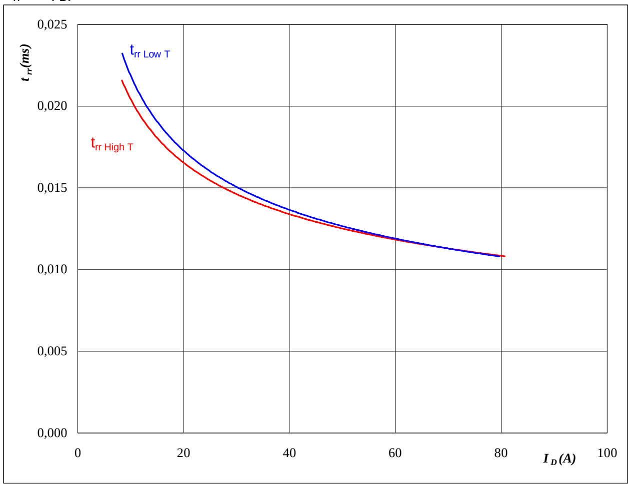
With an inductive load at

T_j =	125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
I_D =	44	A

Figure 11 FWD

Typical reverse recovery time as a function of drain current

$t_{rr} = f(I_D)$



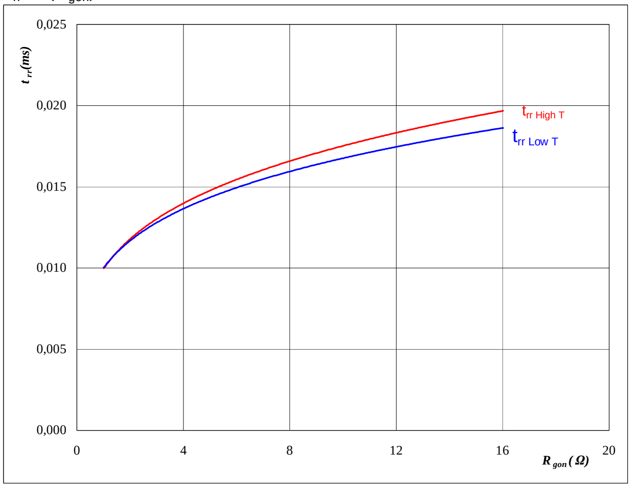
At

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω

Figure 12 FWD

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

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



At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GS} =	+16/-5	V

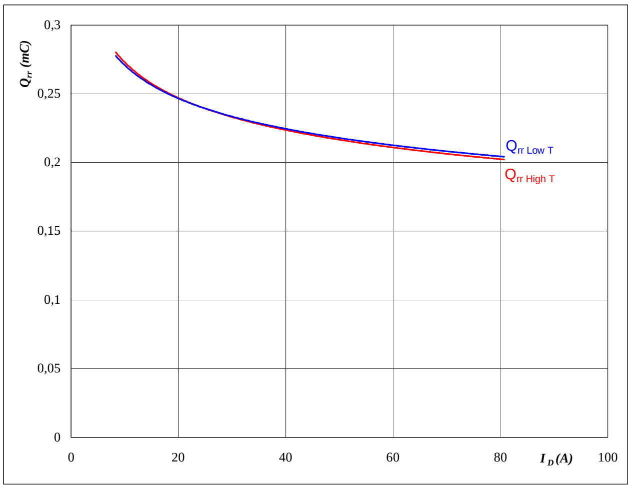
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 13 FWD

Typical reverse recovery charge as a function of drain current

$Q_{rr} = f(I_D)$



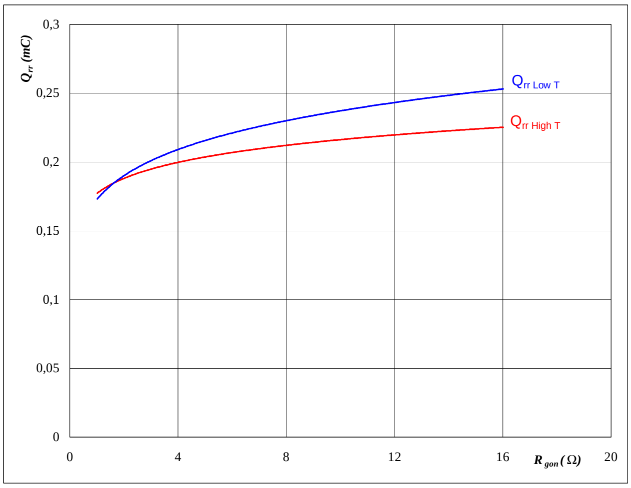
At

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω

Figure 14 FWD

Typical reverse recovery charge as a function of MOSFET turn on gate resistor

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



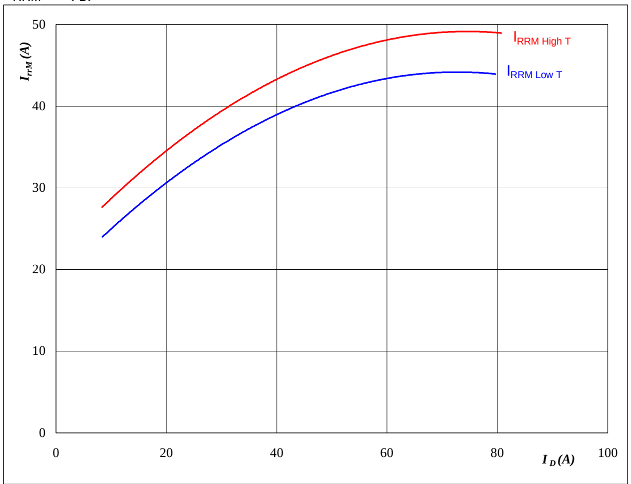
At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GS} =	+16/-5	V

Figure 15 FWD

Typical reverse recovery current as a function of drain current

$I_{RRM} = f(I_D)$



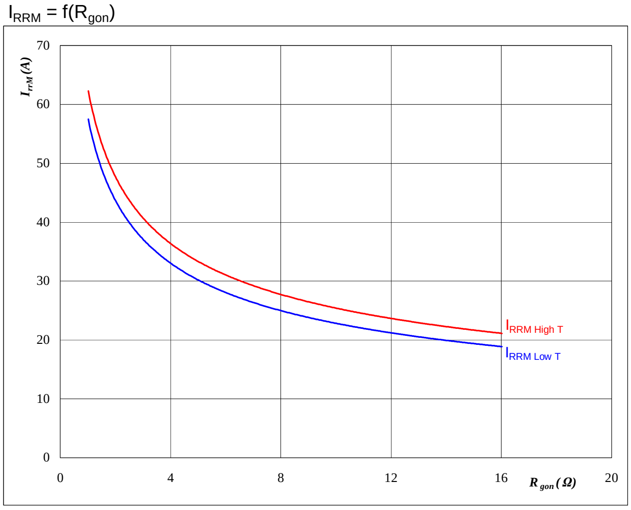
At

T_j =	25/125	℃
V_{DS} =	350	V
V_{GS} =	+16/-5	V
R_{gon} =	4	Ω

Figure 16 FWD

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

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



At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GS} =	+16/-5	V

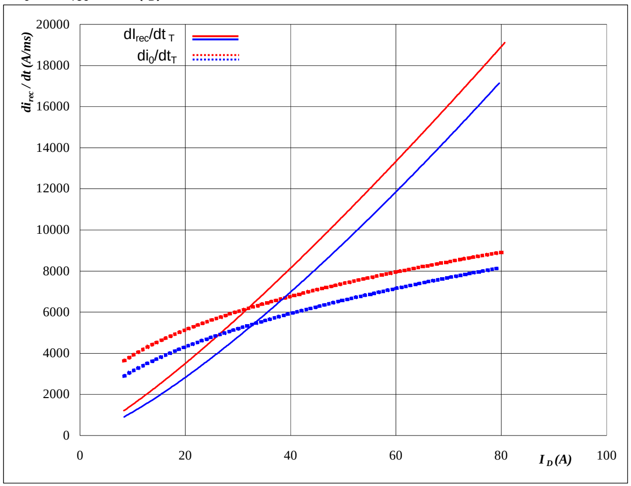
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 17 FWD

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

$dI_0/dt, dI_{rec}/dt = f(I_D)$



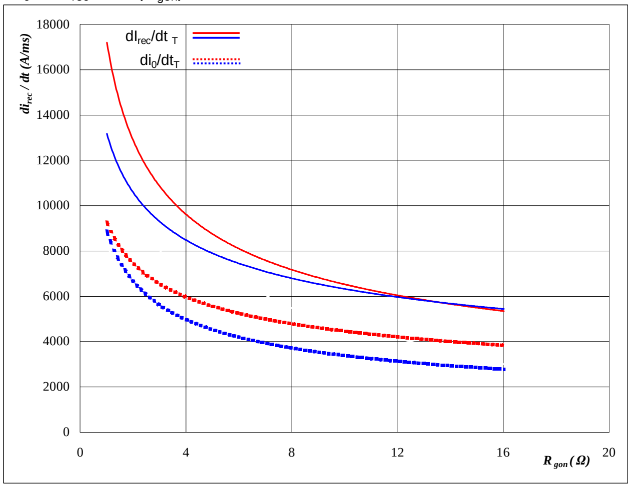
At

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	+16/-5	V
R_{gon} =	4	Ω

Figure 18 FWD

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



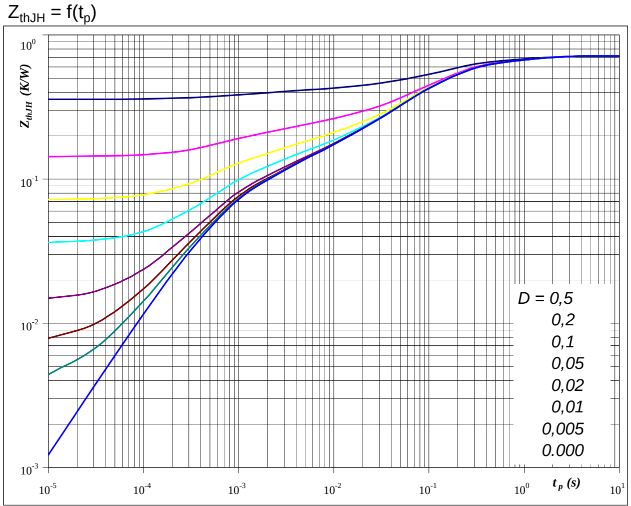
At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GE} =	+16/-5	V

Figure 19 MOSFET

MOSFET transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	0,71	K/W

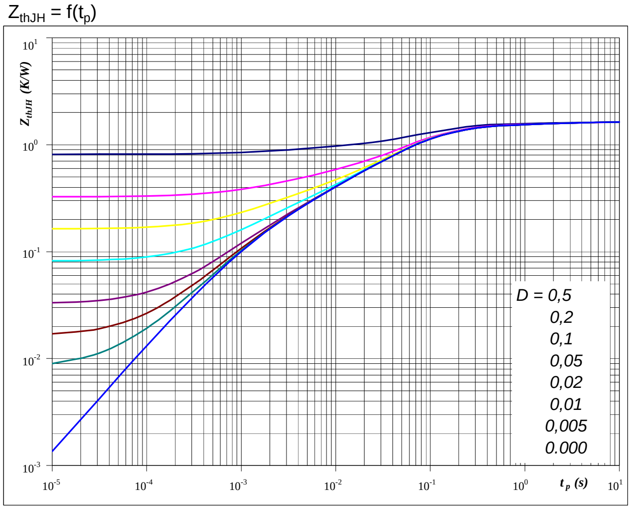
MOSFET thermal model values

R (K/W)	Tau (s)
0,12	9,2E-01
0,36	1,3E-01
0,09	4,4E-02
0,06	6,1E-03
0,08	7,1E-04

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	1,63	K/W

FWD thermal model values

R (K/W)	Tau (s)
0,08	3,0E+00
0,18	5,1E-01
0,85	8,5E-02
0,29	2,6E-02
0,17	3,9E-03
0,06	8,3E-04

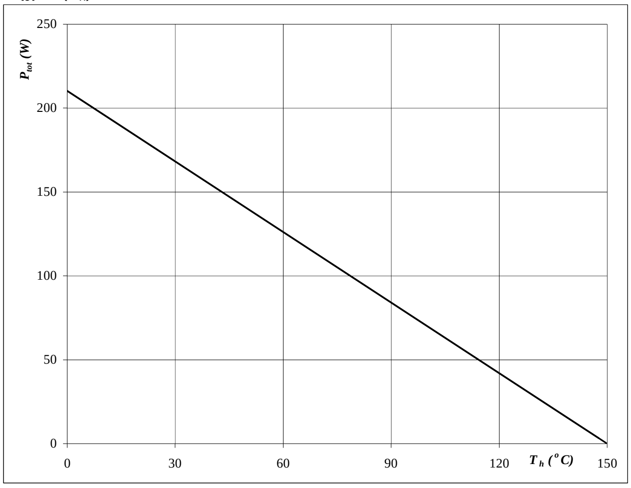
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



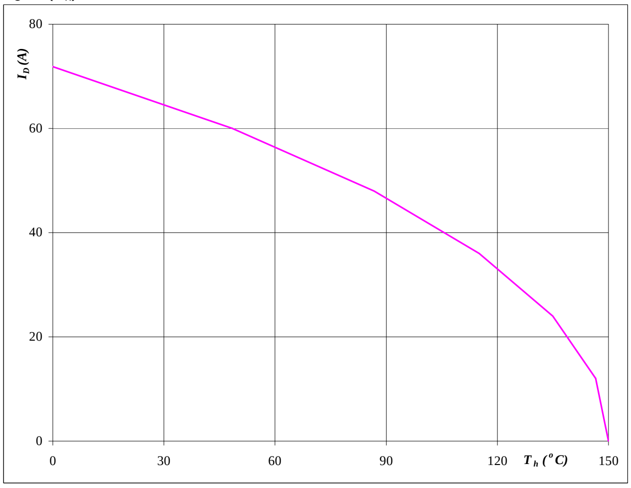
At

T_j = 150 ℃

Figure 22 MOSFET

Drain current as a function of heatsink temperature

$I_C = f(T_h)$



At

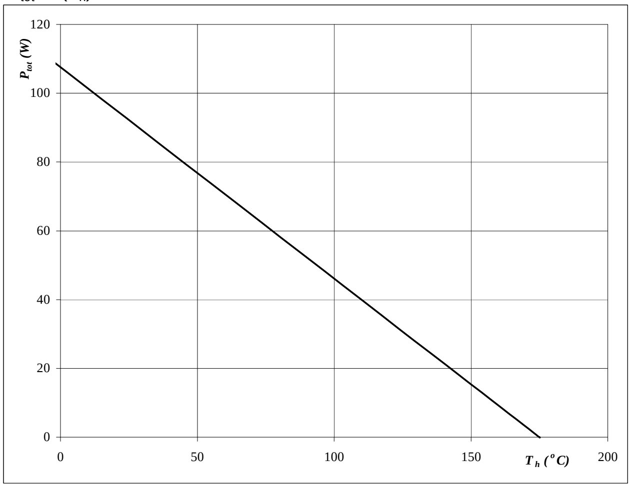
T_j = 150 ℃

V_{GS} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



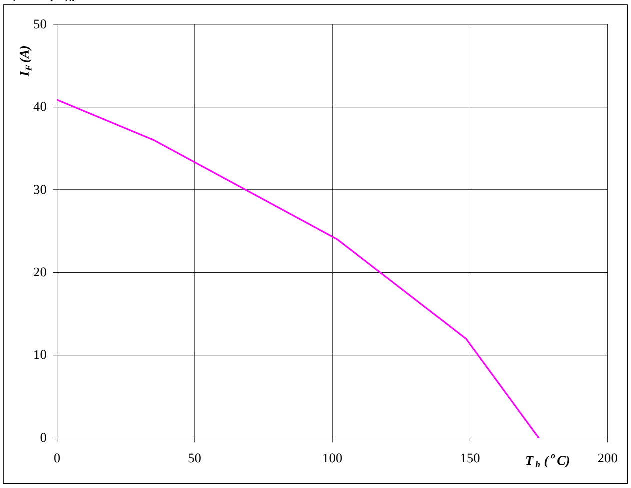
At

T_j = 175 ℃

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

T_j = 175 ℃

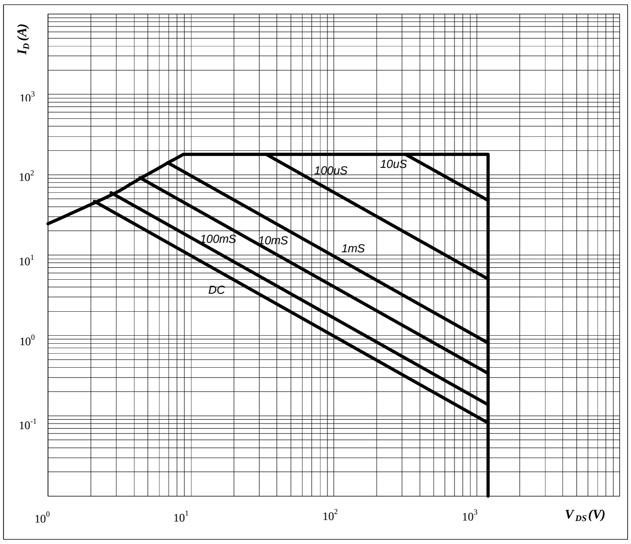
Half Bridge

half bridge MOSFET and neutral point FWD

Figure 25 MOSFET

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$



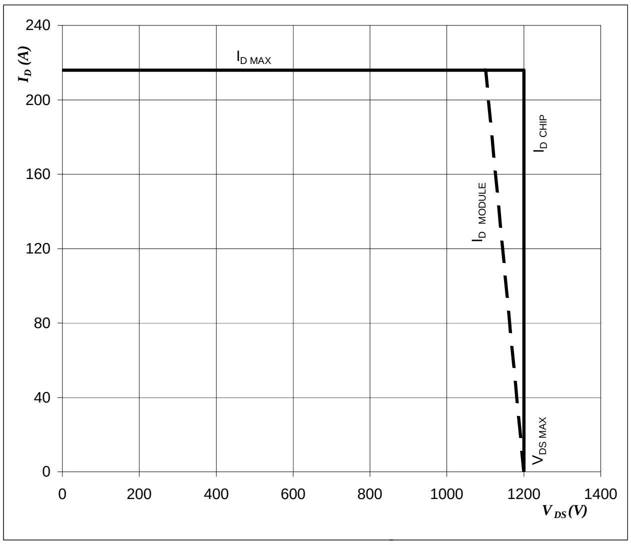
At

D =	single pulse	
Th =	80	ºC
V_{GE} =	15	V
T_j =	T_{jmax}	ºC

Figure 27 MOSFET

Reverse bias safe operating area

$I_D = f(V_{DS})$



At

T_j = T_{jmax}-25 ºC

$V_{DDminus}$=V_{DDplus}

Switching mode : 3 level switching

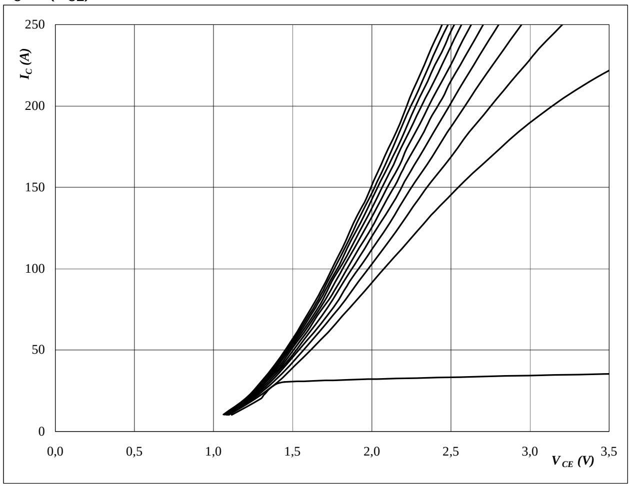
Neutral Point

neutral point IGBT and half bridge FWD

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



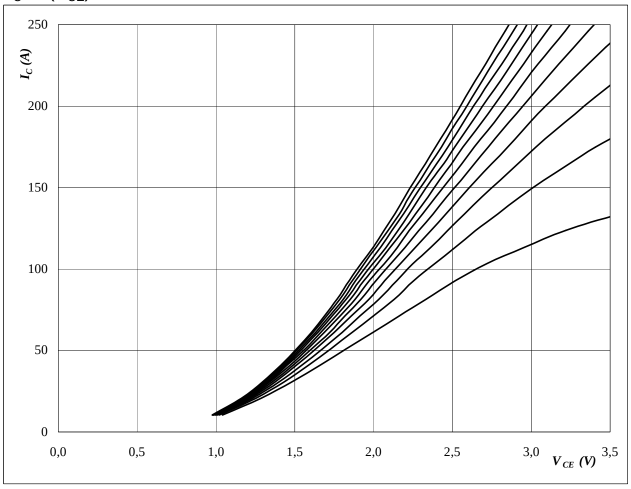
At

t_p =	250	μs
T_j =	25	℃
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 2 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



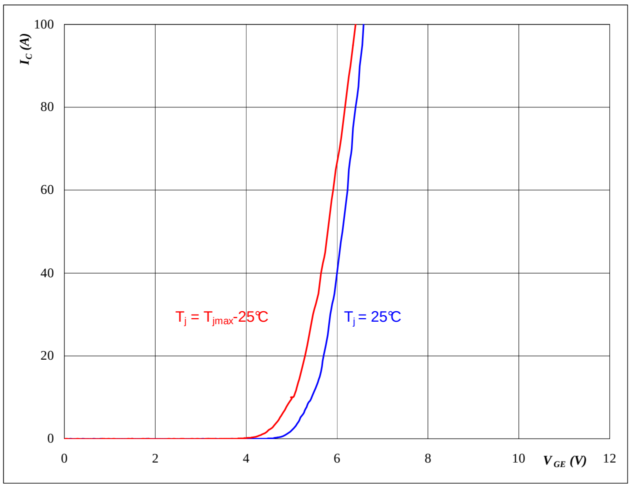
At

t_p =	250	μs
T_j =	125	℃
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 3 IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



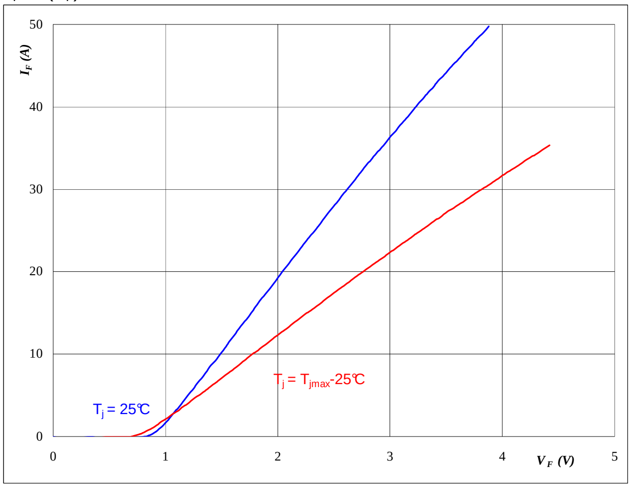
At

t_p =	250	μs
V_{CE} =	0	V

Figure 4 FWD

Typical FWD forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p =	250	μs

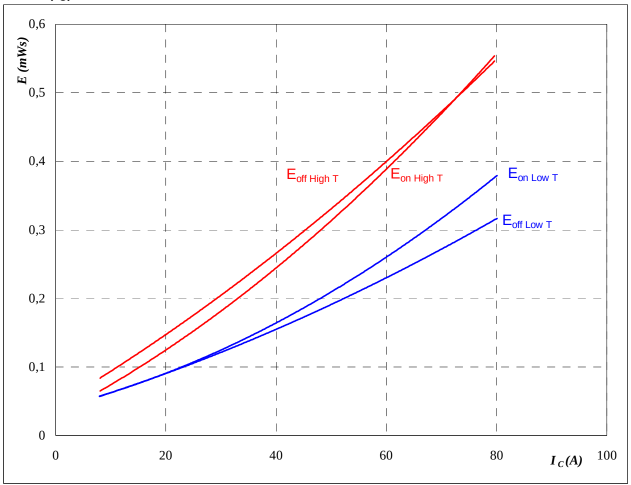
Neutral Point

neutral point IGBT and half bridge FWD

Figure 5 IGBT

Typical switching energy losses
as a function of collector current

E = f(I_C)



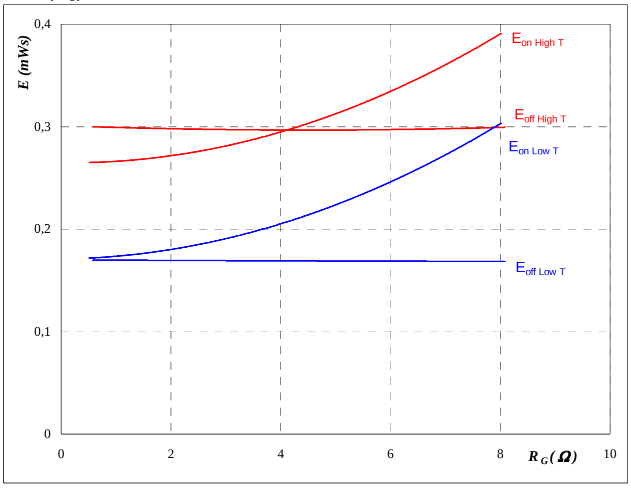
With an inductive load at

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 6 IGBT

Typical switching energy losses
as a function of gate resistor

E = f(R_G)



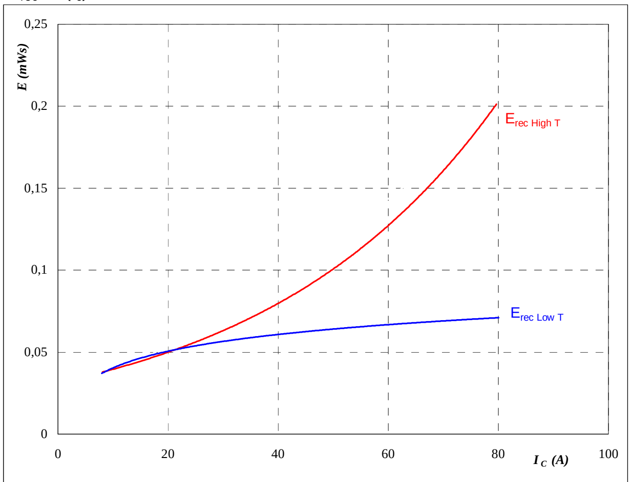
With an inductive load at

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	44	A

Figure 7 FWD

Typical reverse recovery energy loss
as a function of collector current

E_{rec} = f(I_c)



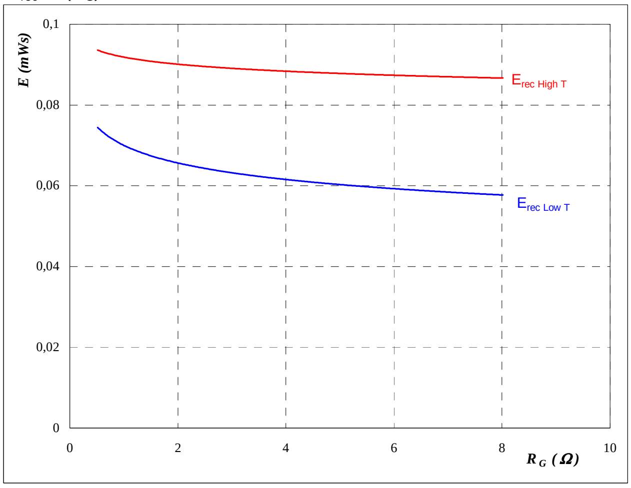
With an inductive load at

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

Figure 8 FWD

Typical reverse recovery energy loss
as a function of gate resistor

E_{rec} = f(R_G)



With an inductive load at

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	44	A

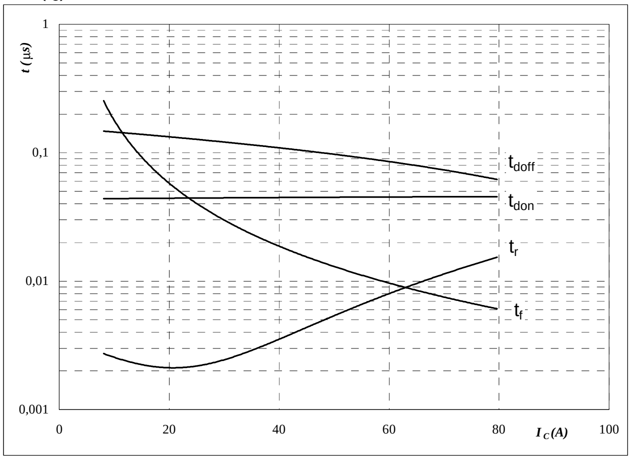
Neutral Point

neutral point IGBT and half bridge FWD

Figure 9 IGBT

Typical switching times as a function of collector current

t = f(I_C)



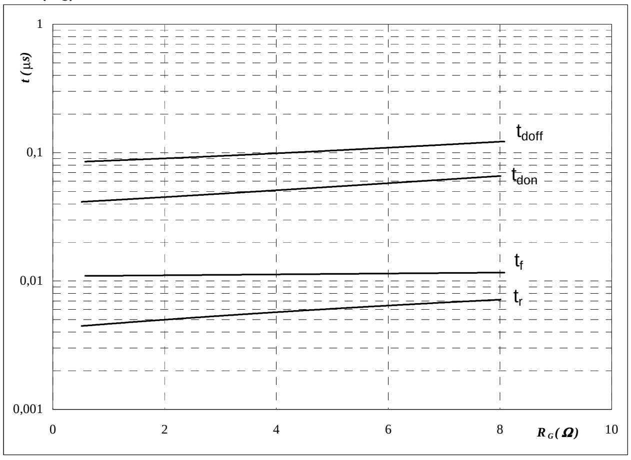
With an inductive load at

T_j =	125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 10 IGBT

Typical switching times as a function of gate resistor

t = f(R_G)



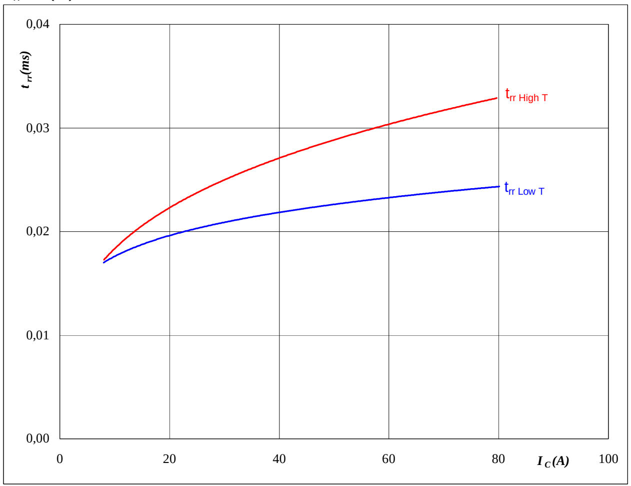
With an inductive load at

T_j =	125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	44	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

t_{rr} = f(Ic)



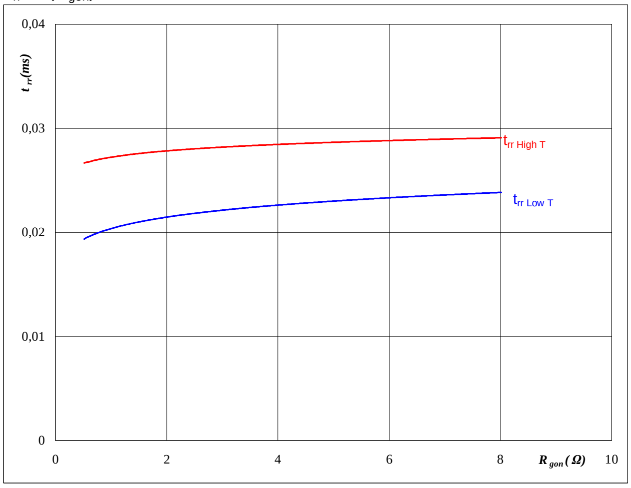
At

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

Figure 12 FWD

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

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



At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GE} =	±15	V

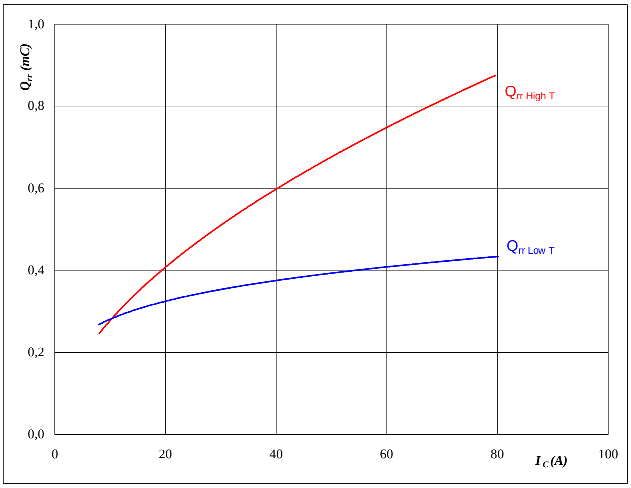
Neutral Point

neutral point IGBT and half bridge FWD

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



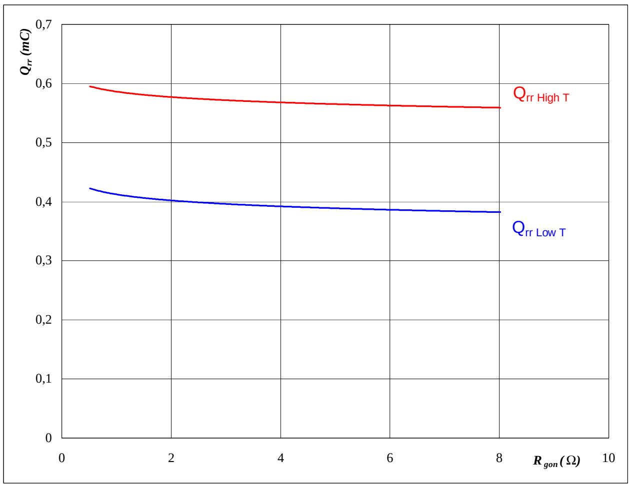
At

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

Figure 14 FWD

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

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



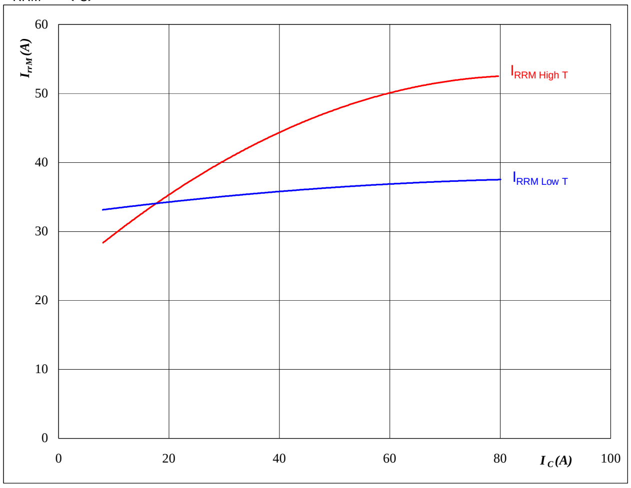
At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GE} =	±15	V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



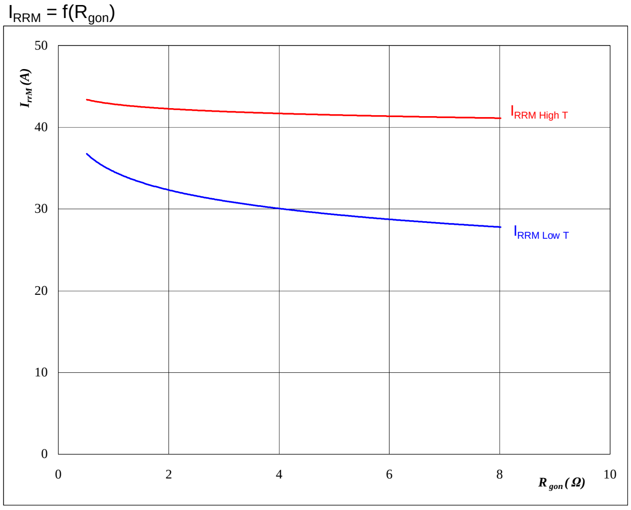
At

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

Figure 16 FWD

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

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



At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GE} =	±15	V

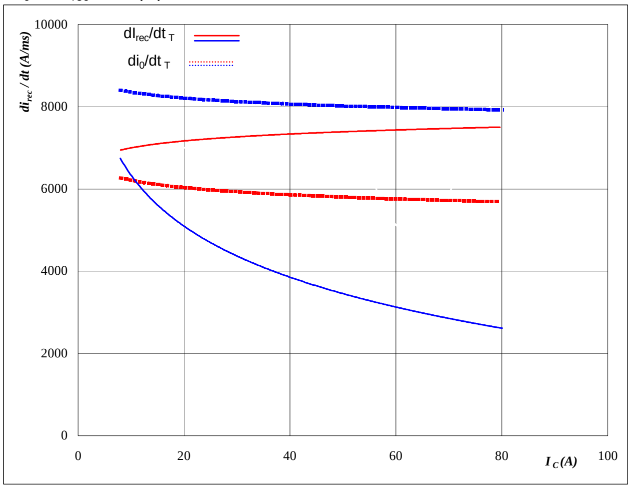
Neutral Point

neutral point IGBT and half bridge FWD

Figure 17	FWD

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

$dI_0/dt, dI_{rec}/dt = f(Ic)$



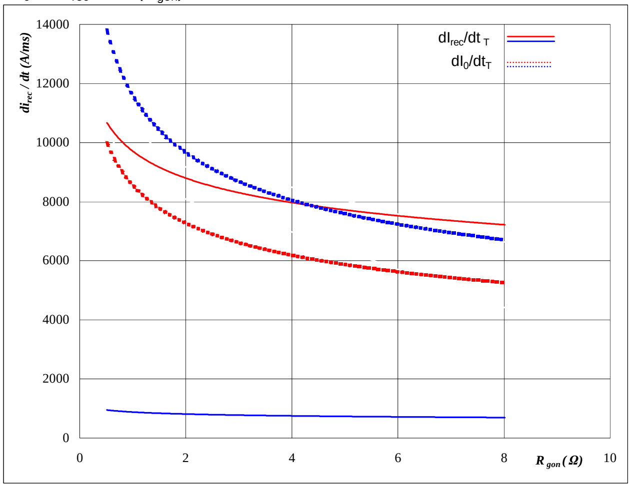
At

T_j =	25/125	℃
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

Figure 18	FWD

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

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



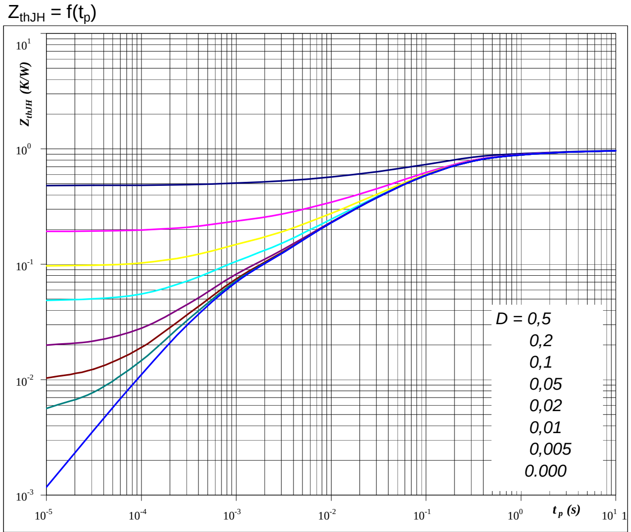
At

T_j =	25/125	℃
V_R =	350	V
I_F =	44	A
V_{GE} =	±15	V

Figure 19	IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	tp / T	
R_{thJH} =	0,96	K/W

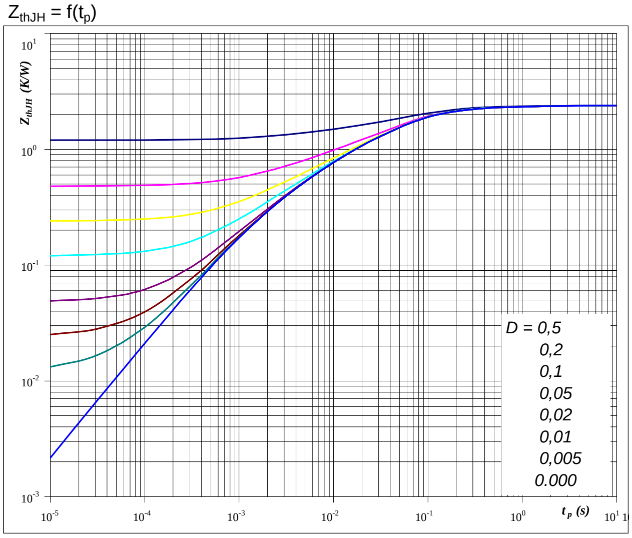
IGBT thermal model values

R (K/W)	Tau (s)
0,10	2,15
0,14	0,45
0,40	0,11
0,16	0,03
0,11	0,01

Figure 20	FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	tp / T	
R_{thJH} =	2,39	K/W

FWD thermal model values

R (K/W)	Tau (s)
0,07	2,91
0,20	0,36
1,24	0,06
0,49	0,02
0,32	0,00

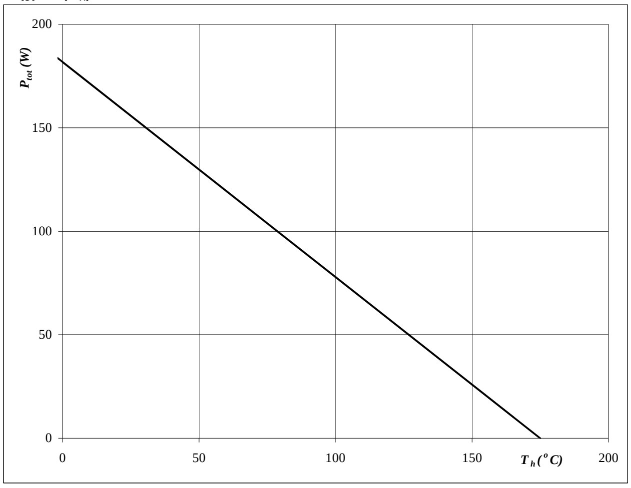
Neutral Point

neutral point IGBT and half bridge FWD

Figure 21 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



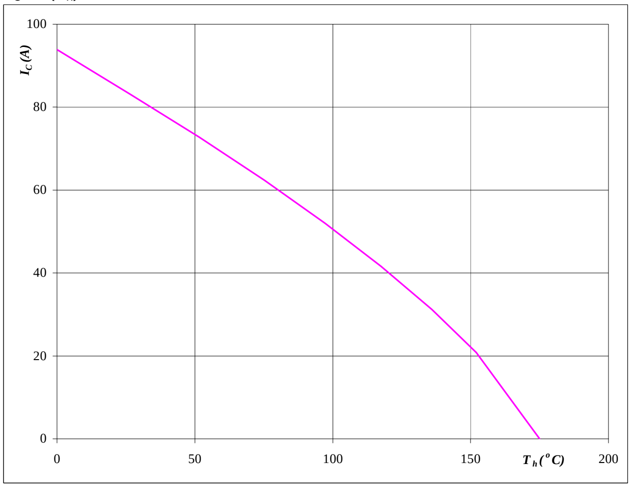
At

T_j = 175 ºC

Figure 22 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

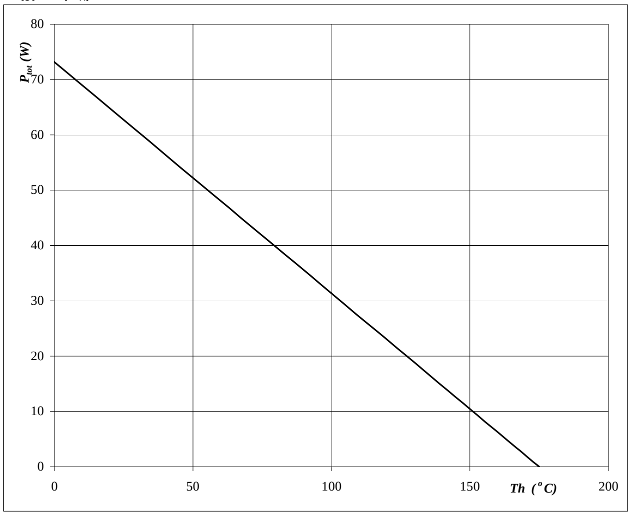
T_j = 175 ºC

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



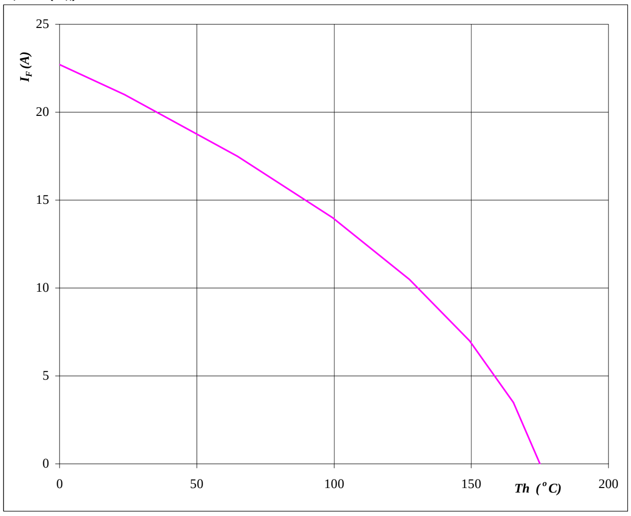
At

T_j = 175 ºC

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

T_j = 175 ºC

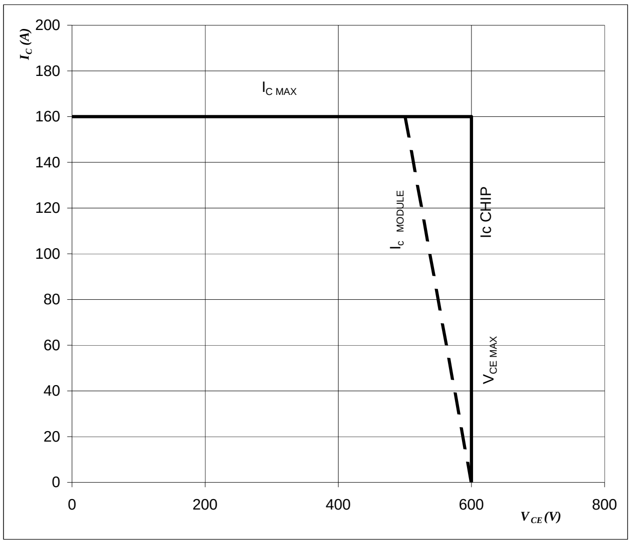
Neutral Point

neutral point IGBT

Figure 25 IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j = T_{jmax}-25 ºC

$U_{ccminus}$=U_{ccplus}

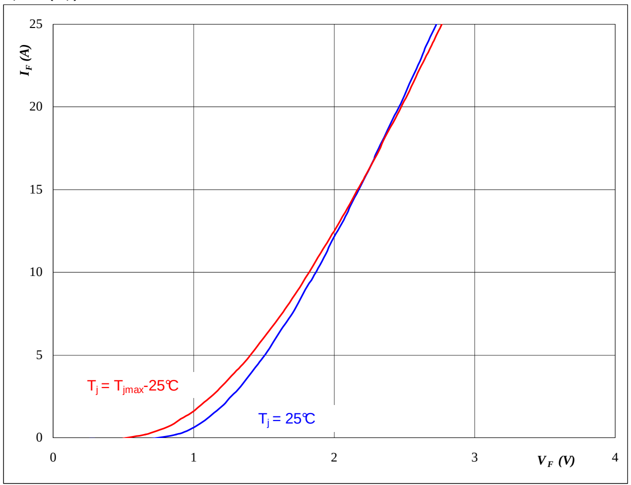
Switching mode : 3 level switching

Neutral Point Inverse Diode

Figure 25 Neutral Point Inverse Diode

Typical FWD forward current as a function of forward voltage

$I_F = f(V_F)$



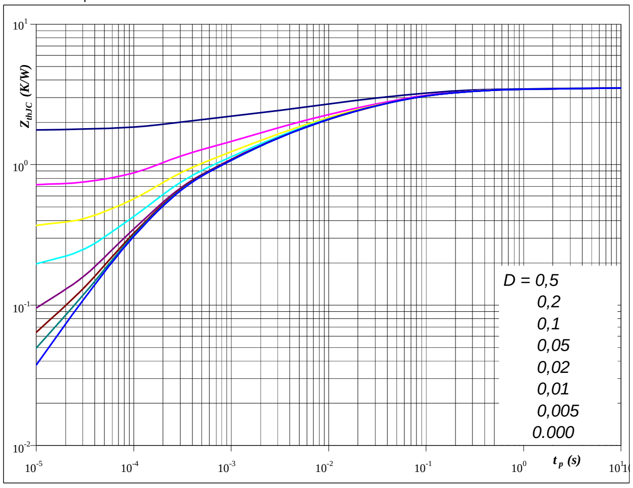
At

t_p =	250	µs

Figure 26 Neutral Point Inverse Diode

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



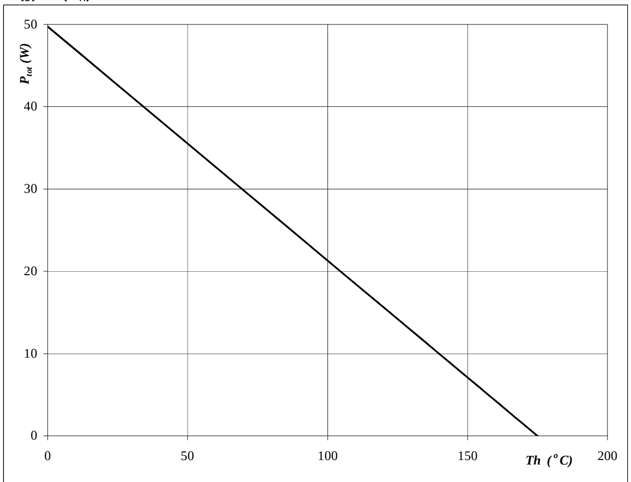
At

D =	tp / T	
R_{thJH} =	3,52	K/W

Figure 27 Neutral Point Inverse Diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



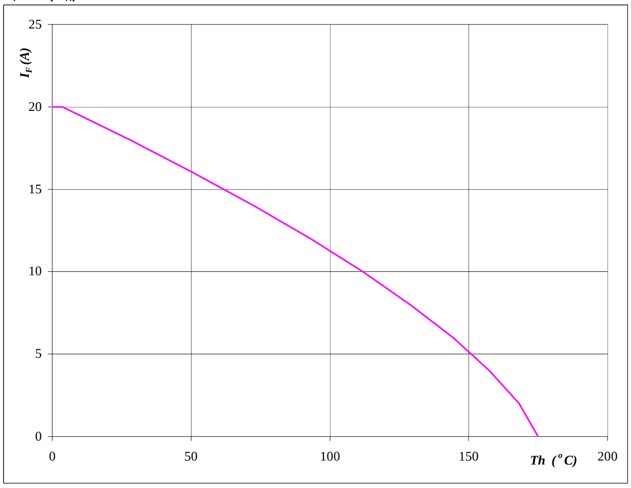
At

T_j =	175	ºC

Figure 28 Neutral Point Inverse Diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



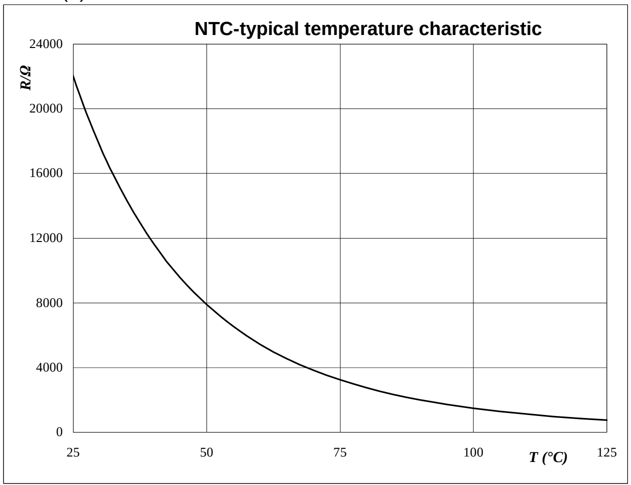
At

T_j =	175	ºC

Thermistor

Figure 1	Thermistor

Typical NTC characteristic
as a function of temperature
$R_T = f(T)$



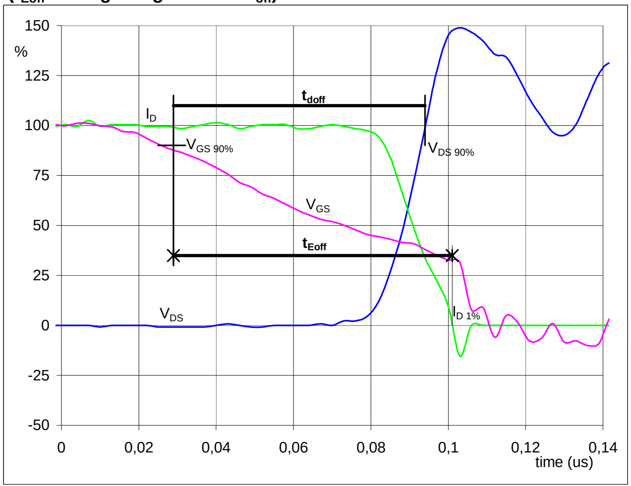
Switching Definitions Half Bridge MOSFET

General conditions

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

Figure 1 Half bridge MOSFET

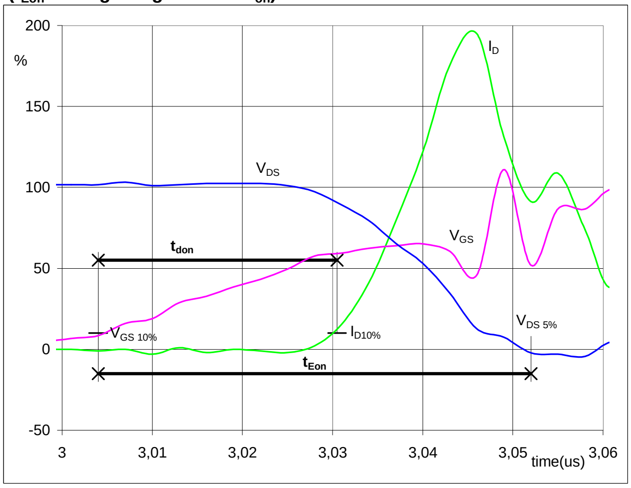
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GS} (0%) =	-5	V
V_{GS} (100%) =	16	V
V_{DS} (100%) =	350	V
I_D (100%) =	44	A
t_{doff} =	0,07	μs
t_{Eoff} =	0,07	μs

Figure 2 Half bridge MOSFET

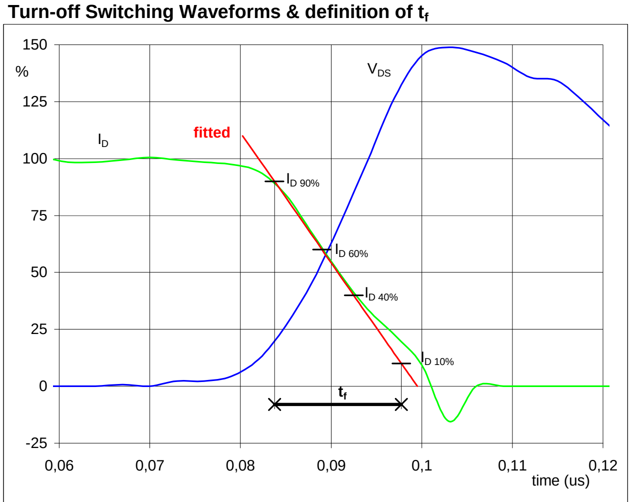
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GS} (0%) =	-5	V
V_{GS} (100%) =	16	V
V_{DS} (100%) =	350	V
I_D (100%) =	44	A
t_{don} =	0,02	μs
t_{Eon} =	0,05	μs

Figure 3 Half bridge MOSFET

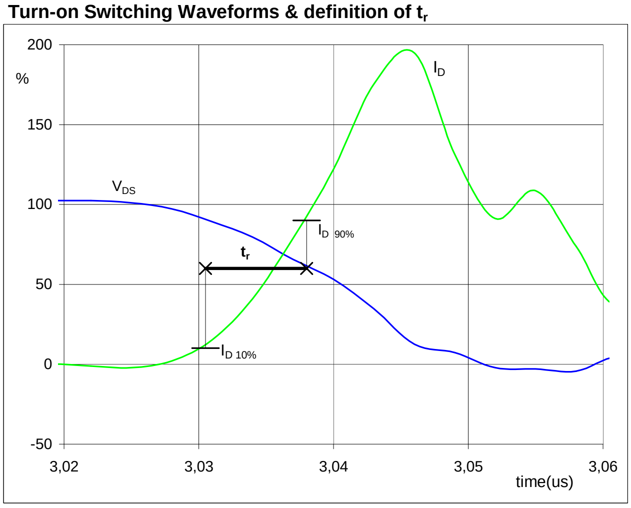
Turn-off Switching Waveforms & definition of t_f



V_{DS} (100%) =	350	V
I_D (100%) =	44	A
t_f =	0,013	μs

Figure 4 Half bridge MOSFET

Turn-on Switching Waveforms & definition of t_r

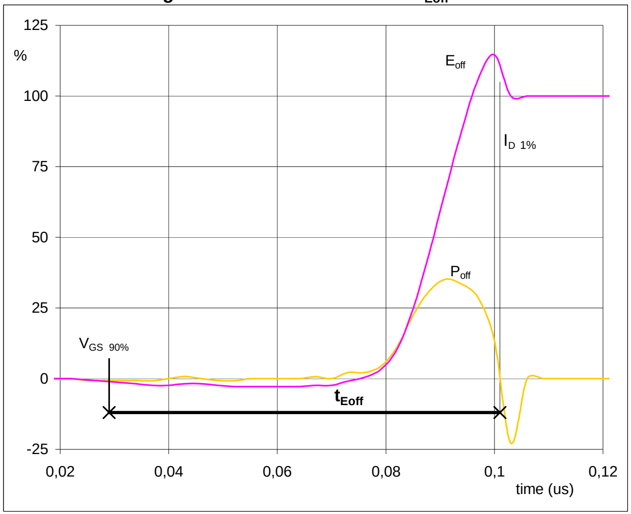


V_{DS} (100%) =	350	V
I_D (100%) =	44	A
t_r =	0,007	μs

Switching Definitions Half Bridge MOSFET

Figure 5 Half bridge MOSFET

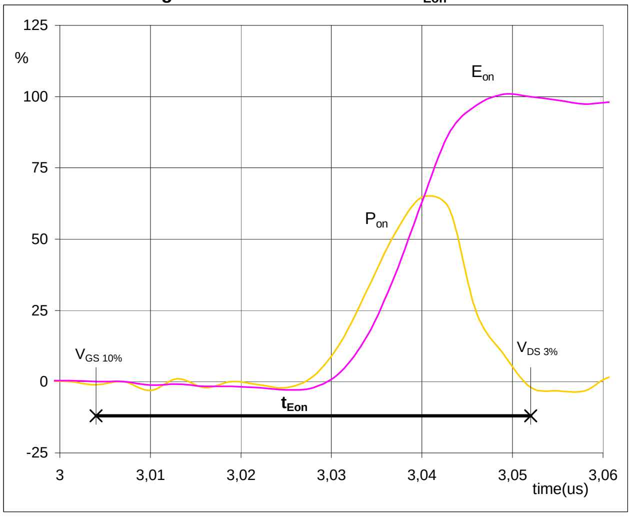
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	15,43	kW
E_{off} (100%) =	0,08	mJ
t_{Eoff} =	0,07	μs

Figure 6 Half bridge MOSFET

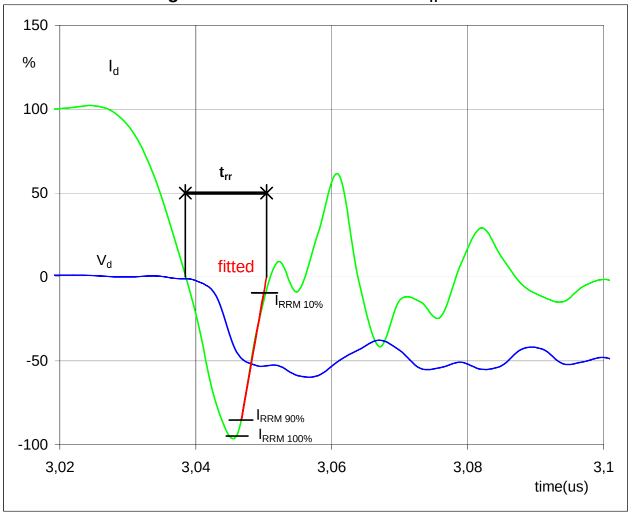
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	15,43	kW
E_{on} (100%) =	0,11	mJ
t_{Eon} =	0,05	μs

Figure 8 neutral point FWD

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

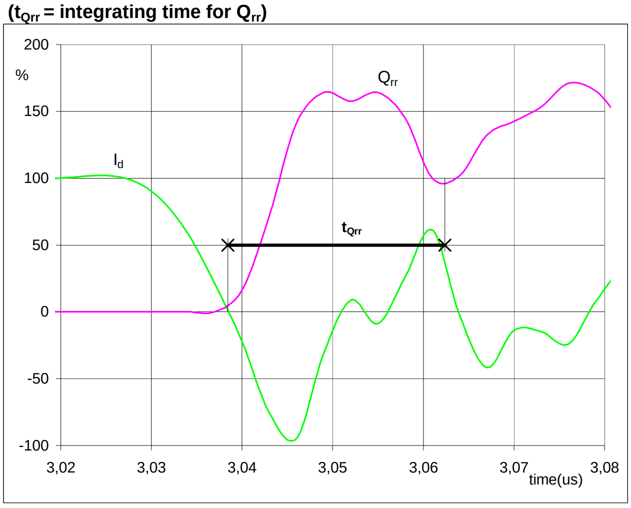


V_d (100%) =	350	V
I_d (100%) =	44	A
I_{RRM} (100%) =	-44	A
t_{rr} =	0,012	μs

Switching Definitions Half Bridge MOSFET

Figure 9 neutral point FWD

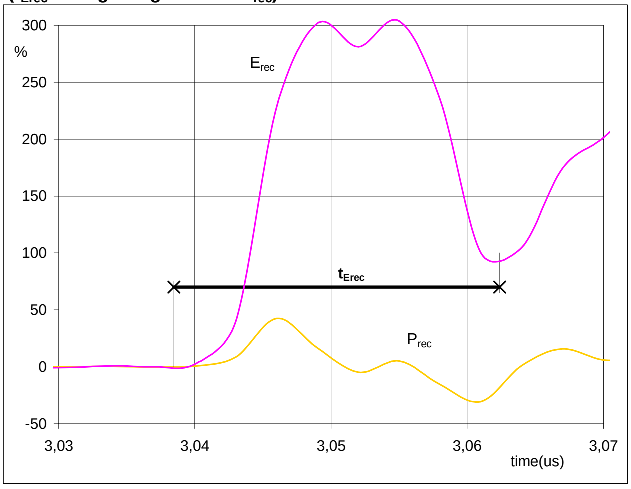
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	44	A
Q_{rr} (100%) =	0,18	μC
t_{Qrr} =	0,024	μs

Figure 10 neutral point FWD

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



P_{rec} (100%) =	15,43	kW
E_{rec} (100%) =	0,023	mJ
t_{Erec} =	0,024	μs

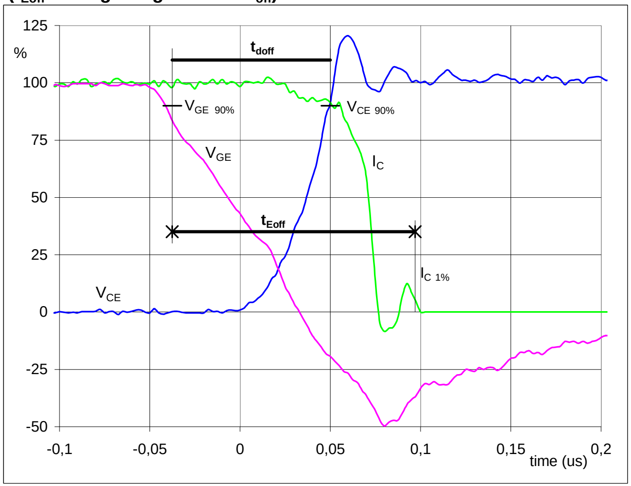
Switching Definitions Neutral Point IGBT

General conditions

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

Figure 1 Neutral Point IGBT

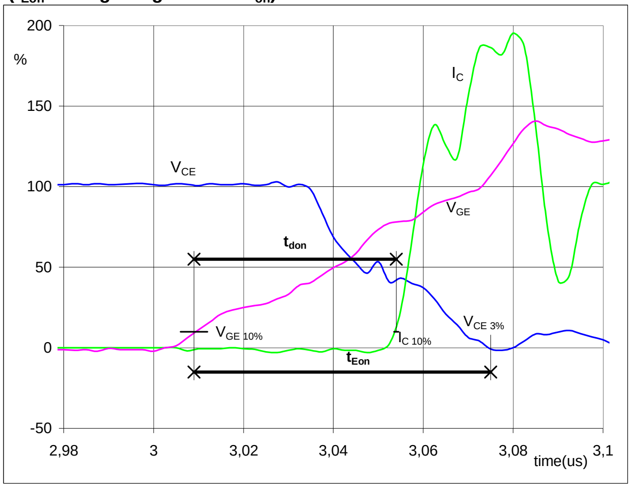
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	23	V
V_C (100%) =	700	V
I_C (100%) =	44	A
t_{doff} =	0,10	μs
t_{Eoff} =	0,17	μs

Figure 2 Neutral Point IGBT

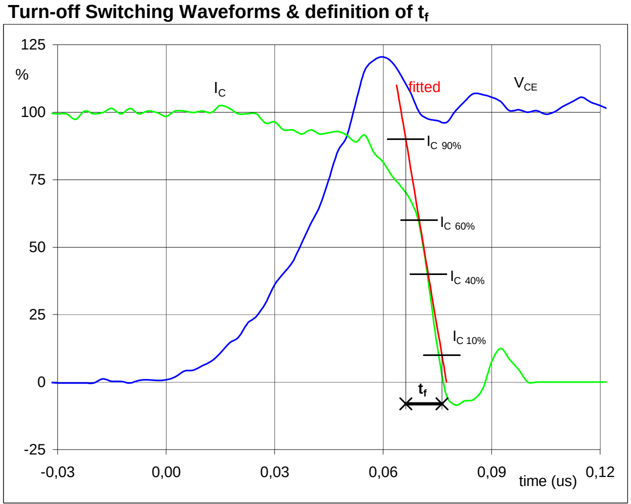
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	23	V
V_C (100%) =	700	V
I_C (100%) =	44	A
t_{don} =	0,05	μs
t_{Eon} =	0,12	μs

Figure 3 Neutral Point IGBT

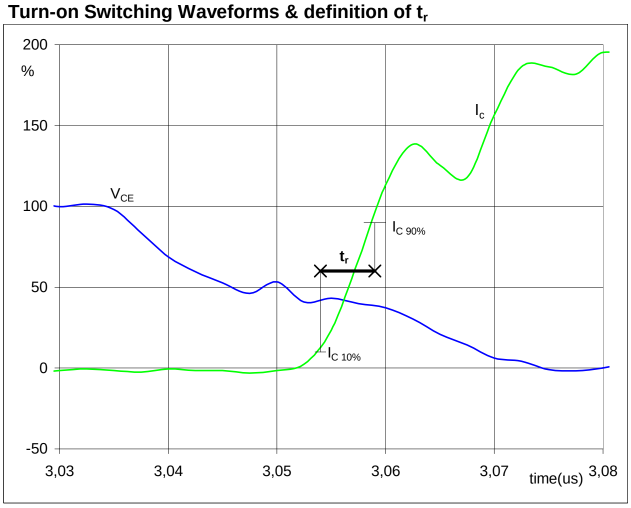
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	700	V
I_C (100%) =	44	A
t_f =	0,011	μs

Figure 4 Neutral Point IGBT

Turn-on Switching Waveforms & definition of t_r

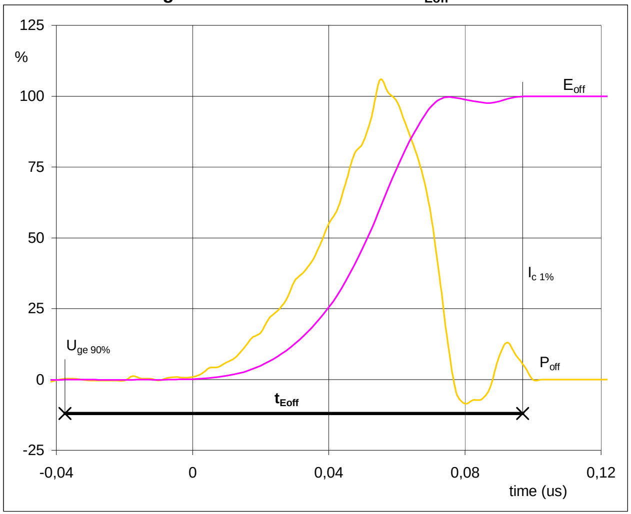


V_C (100%) =	700	V
I_C (100%) =	44	A
t_r =	0,005	μs

Switching Definitions Neutral Point IGBT

Figure 5 Neutral Point IGBT

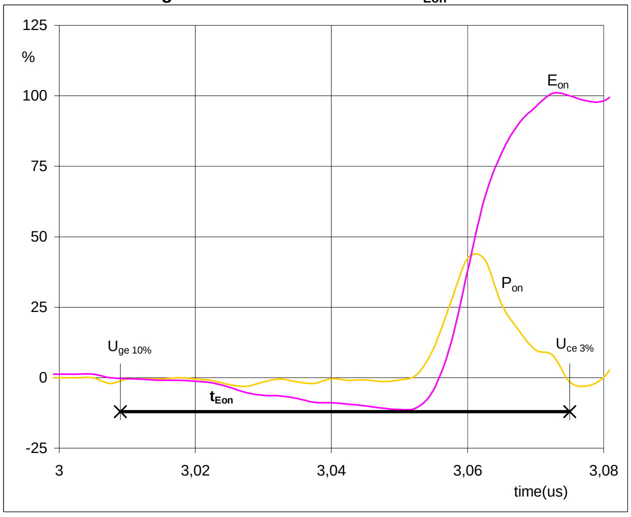
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	30,83	kW
E_{off} (100%) =	0,30	mJ
t_{Eoff} =	0,17	µs

Figure 6 Neutral Point IGBT

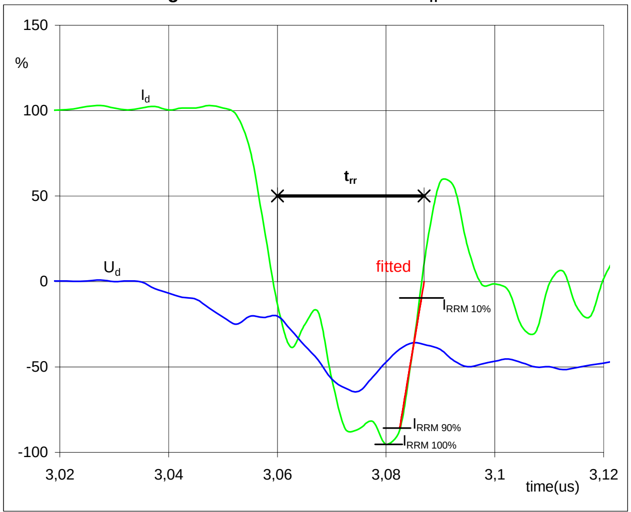
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	30,8259	kW
E_{on} (100%) =	0,38	mJ
t_{Eon} =	0,12	µs

Figure 8 Half Bridge FWD

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

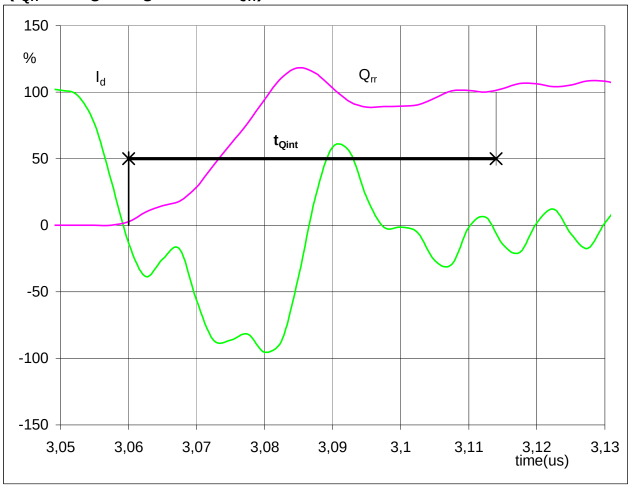


V_d (100%) =	700	V
I_d (100%) =	44	A
I_{RRM} (100%) =	-44	A
t_{rr} =	0,04	µs

Switching Definitions Neutral Point IGBT

Figure 9 Half Bridge FWD

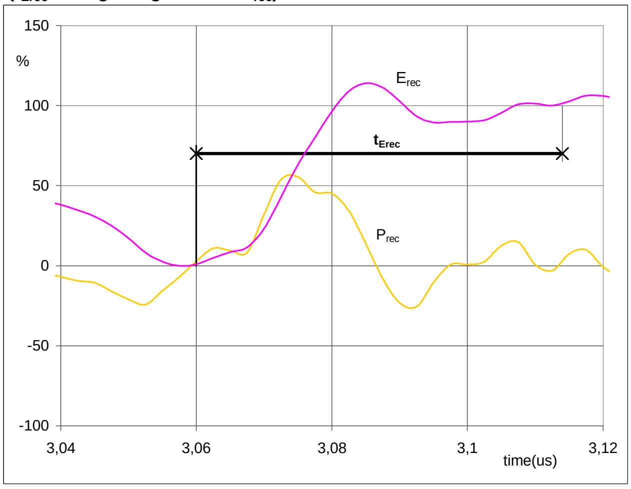
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr}= integrating time for Q_{rr})



I_d (100%) =	44	A
Q_{rr} (100%) =	0,59	μC
t_{Qint} =	0,085	μs

Figure 10 Half Bridge FWD

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



P_{rec} (100%) =	30,83	kW
E_{rec} (100%) =	0,09	mJ
t_{Erec} =	0,09	μs

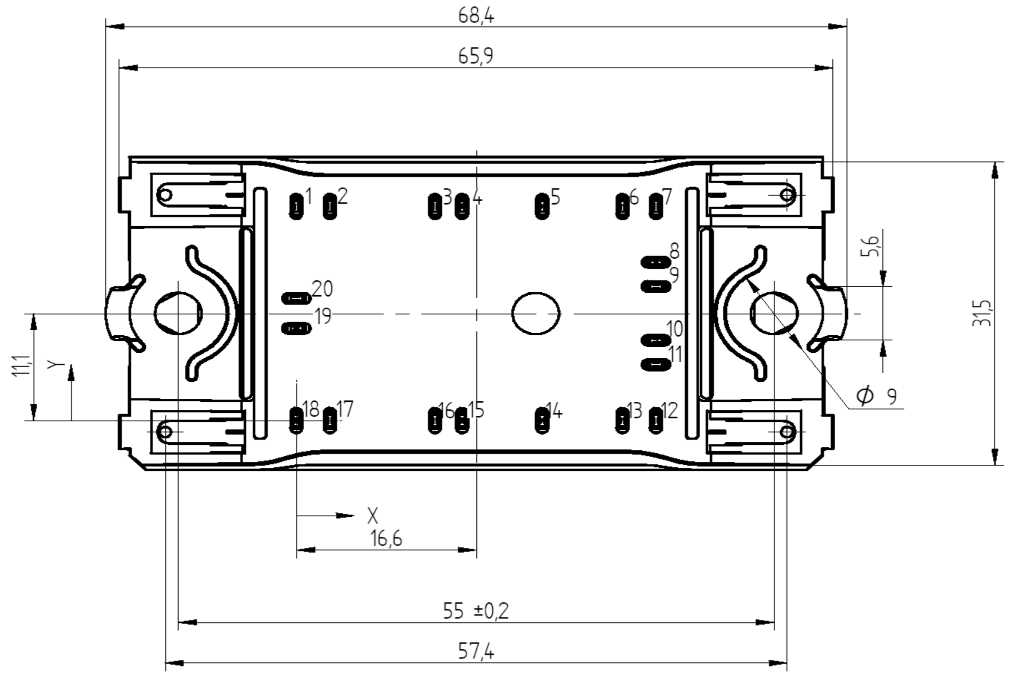
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

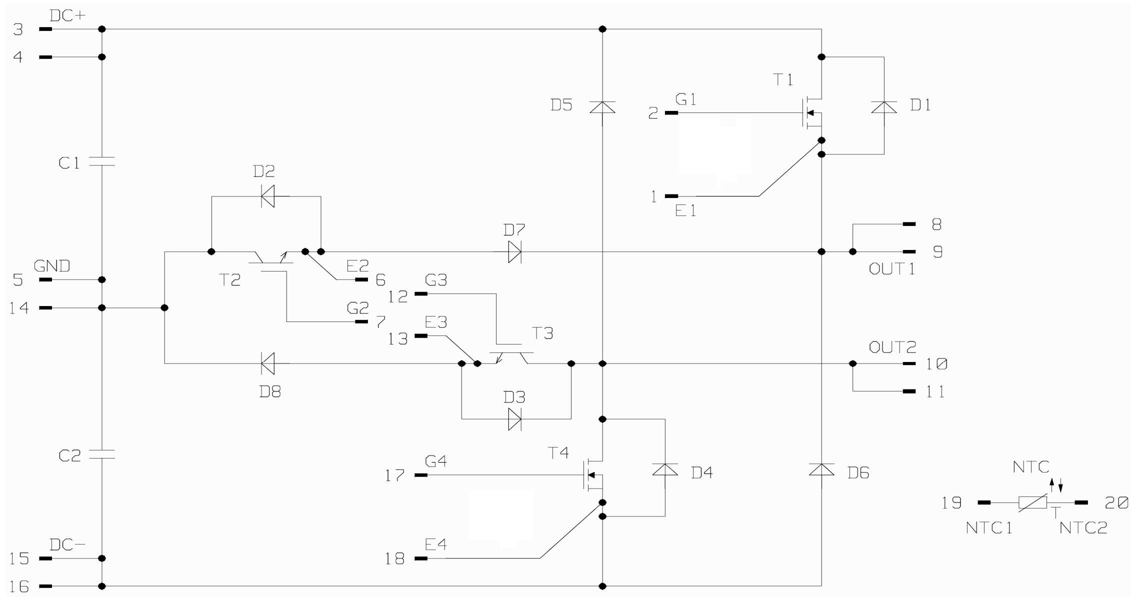
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-PZ12NMA027ME-M340F63Y	M340F63Y	M340F63Y

Outline

Pin table		
Pin	X	Y
1	0	22,2
2	3,1	22,2
3	12,8	22,2
4	15,3	22,2
5	22,7	22,2
6	30,1	22,2
7	33,2	22,2
8	33,2	16,4
9	33,2	13,9
10	33,2	8,3
11	33,2	5,8
12	33,2	0
13	30,1	0
14	22,7	0
15	15,3	0
16	12,8	0
17	3,1	0
18	0	0
19	0	9,55
20	0	12,65



Pinout



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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.