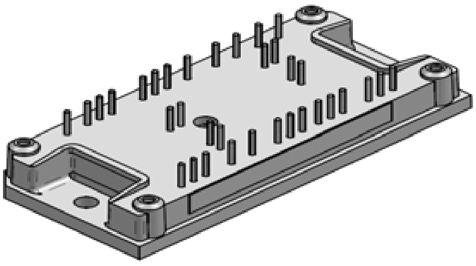
flowSOL 1 BI — 650V/80mΩ

Features

- Low inductive 12mm flow1 package
- Booster:
  - Dual boost topology
  - MOSFET 650V/70mOhm + SiC diode
  - Bypass rectifier
- Inverter:
  - H-bridge topology
  - MOSFET 650V/80mOhm CFD
- Integrated DC-capacitor
- Temperature sensor

flow1 12mm housing

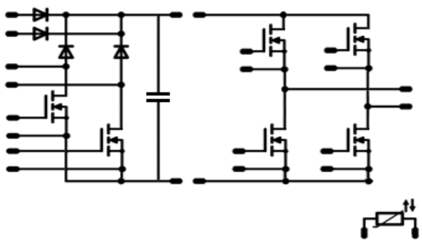


Target Applications

- Solar Inverter:

Primary of high efficient HF transformer-based solar inver

Schematic



Types

- 10-FY06BIA080MF-M527E58

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Bypass Diode (D1 , D2)				
Repetitive peak reverse voltage	V_{RRM}		1600	V
Forward current per diode	I_{FAV}	DC current T_h=80°C T_c=80°C	41 50	A
Surge forward current	I_{FSM}	t_p=10ms T_j=25°C	370	A
I2t-value	I^2t		370	A^2s
Power dissipation per Diode	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	50 76	W
Maximum Junction Temperature	$T_j$max		150	°C
Input Boost MOSFET (T1, T2)				
Drain to source breakdown voltage	V_{DS}		650	V
DC drain current	I_D	T_j=$T_j$max T_h=80°C T_c=80°C	22 27	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	150	A
Power dissipation	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	78 117	W
Gate-source peak voltage	V_{GS}		±30	V
Maximum Junction Temperature	$T_j$max		150	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Input Boost Diode (D3 , D4)					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25°C		600	V
DC forward current	I_F	$T_j=T_j$max	T_h=80°C T_c=80°C	20 24	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max		57	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80°C T_c=80°C	46 70	W
Maximum Junction Temperature	$T_j$max			175	°C
H-Bridge MOSFET (T3 , T4 , T5 , T6)					
Drain to source breakdown voltage	V_{DS}			650	V
DC drain current	I_D	$T_j=T_j$max	T_h=80°C T_c=80°C	21 26	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	Tc=25°C	137	A
Power dissipation	P_{tot}	$T_j=T_j$max	T_h=80°C T_c=80°C	84 128	W
Gate-source peak voltage	Vgs			±30	V
Maximum Junction Temperature	$T_j$max			150	°C
H-Bridge Body Diode					
Peak Repetitive Reverse Voltage	V_{RRM}	T_j=25°C		650	V
DC forward current	I_F	$T_j=T_j$max	T_h=80°C T_c=80°C	50 50	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max		50 140	A
Power dissipation per Diode	P_{tot}	$T_j=T_j$max	T_h=80°C T_c=80°C	84 128	W
Maximum Junction Temperature	$T_j$max			150	°C
DC link Capacitor (C1)					
Max.DC voltage	V_{MAX}		Tc=25°C	630	V
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	°C
Insulation Properties					
Insulation voltage	V_{is}	t=2s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm

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	
Bypass Diode (D1 , D2)										
Forward voltage	V_F				35	Tj=25°C Tj=125°C		1,18 1,17	1,21	V
Threshold voltage (for power loss calc. only)	V_{to}				35	Tj=25°C Tj=125°C		0,91 0,80		V
Slope resistance (for power loss calc. only)	r_t				35	Tj=25°C Tj=125°C		0,01 0,01		Ω
Reverse current	I_r			1600		Tj=25°C Tj=125°C			0,05	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,40		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,92		
Input Boost MOSFET (T1 , T2)										
Static drain to source ON resistance	$R_{DS(on)}$		10		20	Tj=25°C Tj=125°C		78 127		mΩ
Gate threshold voltage	$V_{(GS)th}$				0,00176	Tj=25°C Tj=125°C	2,5	3	3,5	V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25°C Tj=125°C			100	nA
Zero Gate Voltage Drain Current	I_{dss}		0	650		Tj=25°C Tj=125°C			1000	nA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=2 Ω Rgon=2 Ω	10	400	20	Tj=25°C Tj=125°C		22 21		ns
Rise Time	t_r					Tj=25°C Tj=125°C		4 4		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		105 110		
Fall time	t_f					Tj=25°C Tj=125°C		6 5		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,07 0,08		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,00 0,01		
Total gate charge	Q_g	Rgon=2 Ω	10	480	26,3	Tj=25°C Tj=125°C		170		nC
Gate to source charge	Q_{gs}					Tj=25°C Tj=125°C		20		
Gate to drain charge	Q_{gd}					Tj=25°C Tj=125°C		85		
Input capacitance	C_{iss}	f=1MHz	0	100		Tj=25°C		3900		pF
Output capacitance	C_{oss}							215		
Reverse transfer capacitance	C_{rss}							tbd.		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,90		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,60		
Input Boost Diode (D3 , D4)										
Forward voltage	V_F				8	Tj=25°C Tj=125°C		1,24 1,34	1,8	V
Reverse leakage current	I_{rm}		10	400	20	Tj=25°C Tj=125°C			50	μA
Peak recovery current	I_{RRM}	Rgon=2 Ω	10	400	20	Tj=25°C Tj=125°C		25 22		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		8 9		ns
Reverse recovery charge	Q_{rr}					Tj=25°C Tj=125°C		0,14 0,20		μC
Reverse recovered energy	E_{rec}					Tj=25°C Tj=125°C		0,02 0,05		mWs
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		8216 7261		A/μs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						2,06		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,36		

Characteristic Values

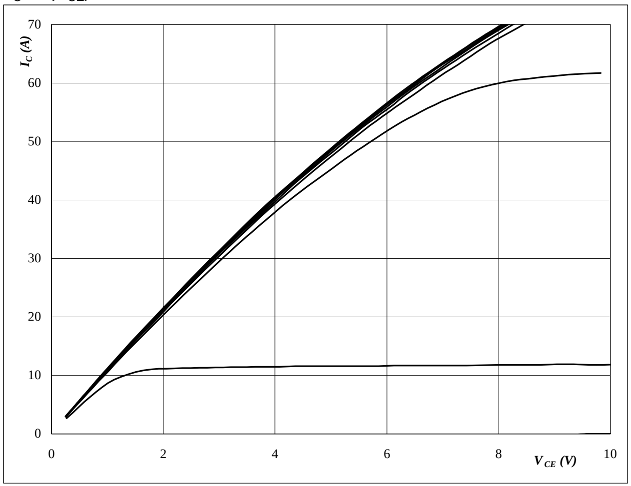
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j	Min	Typ	Max	
H-Bridge MOSFET (T3 , T4 , T5 , T6)										
Static drain to source ON resistance	$R_{ds(on)}$		10		43	Tj=25°C Tj=125°C		96 164		mΩ
Gate threshold voltage	$V_{(GS)th}$			V_{DS}=V_{GS}	0,00176	Tj=25°C Tj=125°C	3,5	4	4,5	V
Gate to Source Leakage Current	I_{gss}		20	0		Tj=25°C Tj=125°C			100	nA
Zero Gate Voltage Drain Current	I_{dss}		0	650		Tj=25°C Tj=125°C			1000	nA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=2 Ω Rgon=128 Ω	10	400	20	Tj=25°C Tj=125°C		355 307		ns
Rise Time	t_r					Tj=25°C Tj=125°C		149 165		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		94 98		
Fall time	t_f					Tj=25°C Tj=125°C		4 5		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		2,24 3,73		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,01 0,01		
Total gate charge	Q_g		0/10	480	26,3	Tj=25°C		170		nC
Gate to source charge	Q_{gs}							25		
Gate to drain charge	Q_{gd}							120		
Input capacitance	C_{iss}	f=1MHz	0	25		Tj=25°C		5030		pF
Output capacitance	C_{oss}							215		
Reverse transfer capacitance	C_{rss}							tbd.		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,83		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,55		
H-Bridge Body Diode										
Diode forward voltage	V_F				43	Tj=25°C Tj=125°C		1,18 1,09		V
Peak reverse recovery current	I_{RRM}	Rgon=128 Ω	10	400	20	Tj=25°C Tj=125°C		13 24		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		122 216		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,96 2,85		μC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		1469 2749		A/μs
Reverse recovery energy	E_{rec}					Tj=25°C Tj=125°C		0,03 0,07		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						0,83		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,55		
DC link Capacitor (C1)										
C value	C							47		nF
Thermistor										
Rated resistance	R					Tj=25°C		22000		Ω
Deviation of R25	ΔR/R	R100=1486 Ω				Tj=100°C	-5		+5	%
Power dissipation	P					Tj=25°C		200		mW
Power dissipation constant						Tj=25°C		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				Tj=25°C		3950		K
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25°C		3996		K
Vincotech NTC Reference						Tj=25°C			B	

H-Bridge

Figure 1	MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



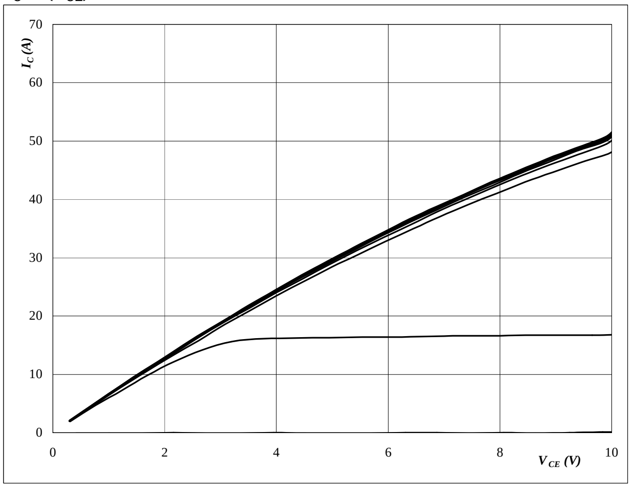
At

t_p =	250	μs
T_j =	25	°C
V_{GE} from	0 V to 20 V in steps of 2 V	

Figure 2	MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



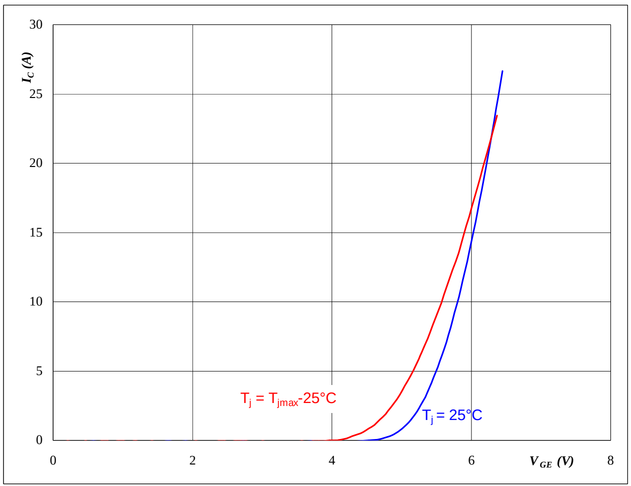
At

t_p =	250	μs
T_j =	125	°C
V_{GE} from	0 V to 20 V in steps of 2 V	

Figure 3	MOSFET

Typical transfer characteristics

$I_C = f(V_{GE})$



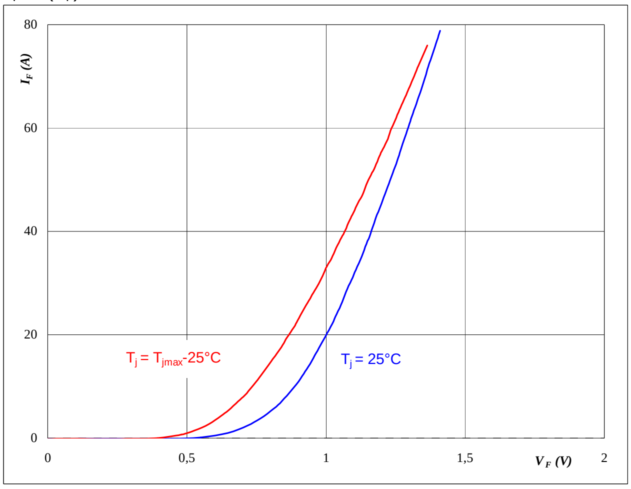
At

t_p =	250	μs
V_{CE} =	10	V

Figure 4	FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

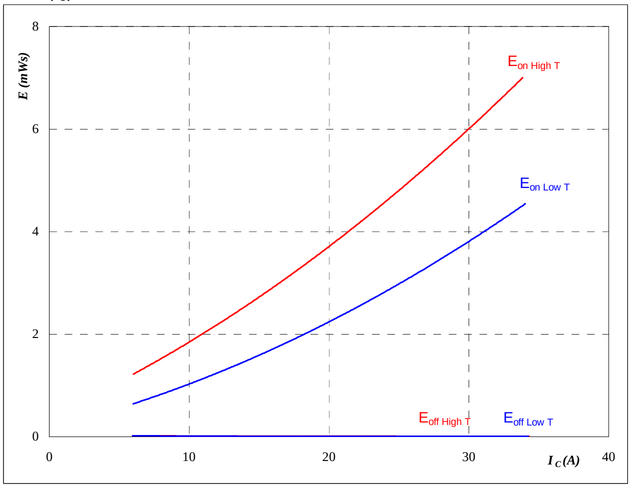
t_p =	250	μs

H-Bridge

Figure 5 MOSFET

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



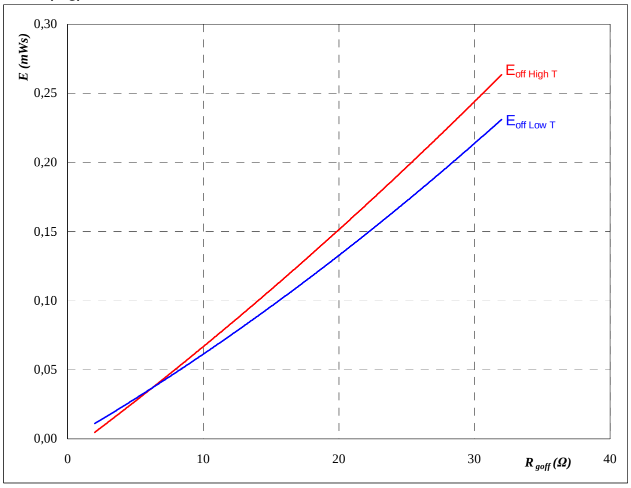
With an inductive load at

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω
R_{goff} =	2	Ω

Figure 6 MOSFET

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



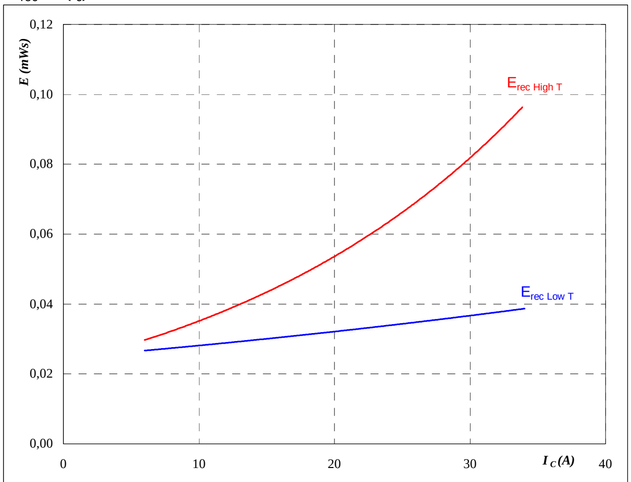
With an inductive load at

T_j =	25/125	°C	R_{gon} =	128	Ω
V_{CE} =	400	V			
V_{GE} =	10	V			
I_C =	20	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

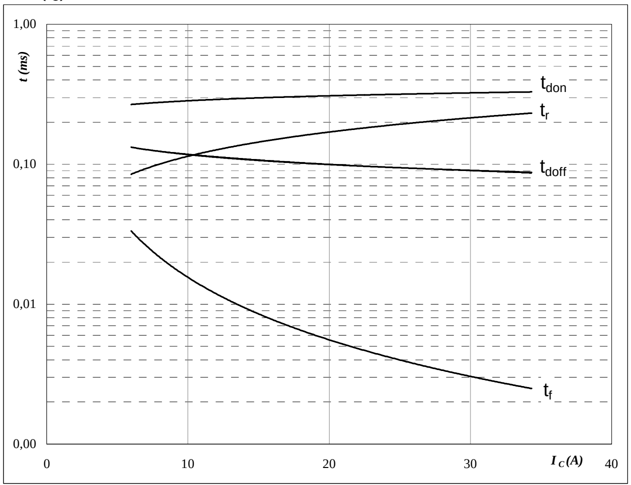
T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω

H-Bridge

Figure 9 MOSFET

Typical switching times as a function of collector current

$t = f(I_C)$



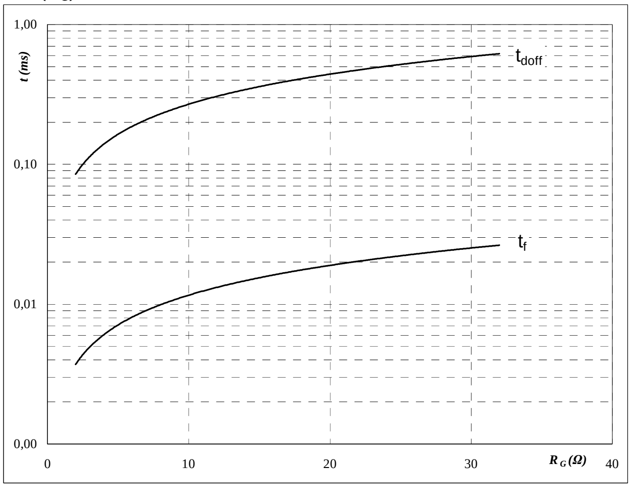
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω
R_{goff} =	2	Ω

Figure 10 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



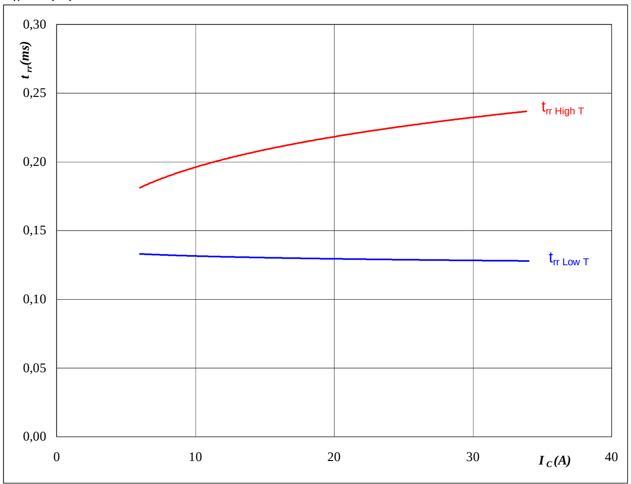
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	10	V
I_C =	20	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(Ic)$



At

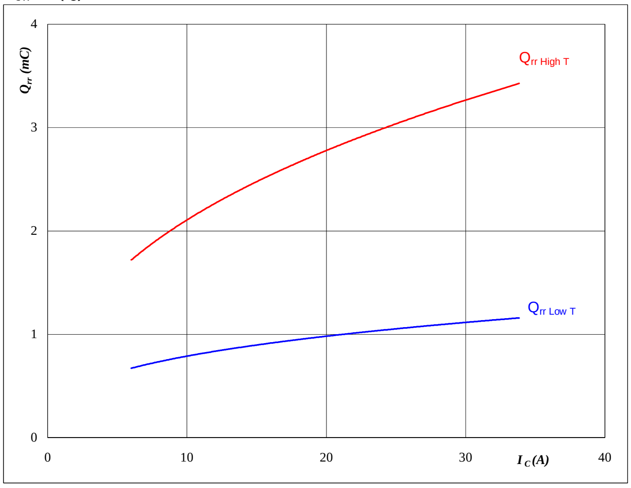
T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω

H-Bridge

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



At

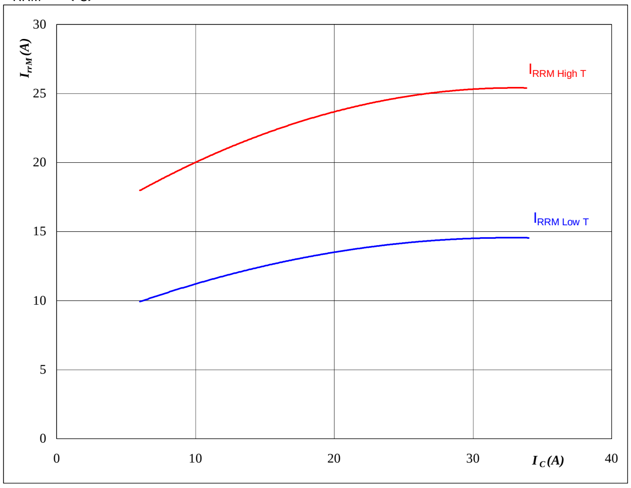
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



At

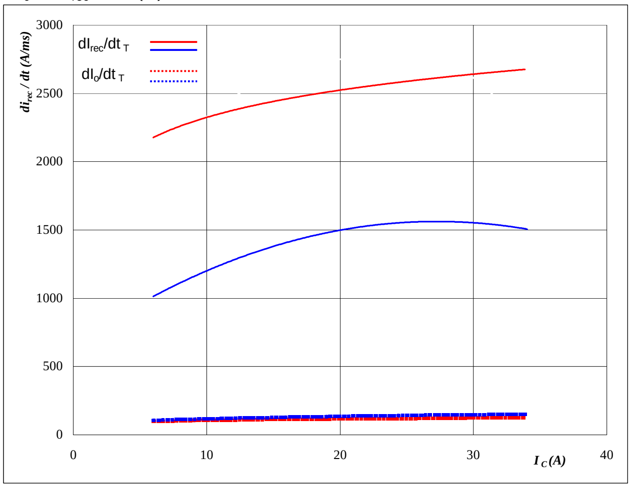
T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω

H-Bridge

Figure 17 FWD

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

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



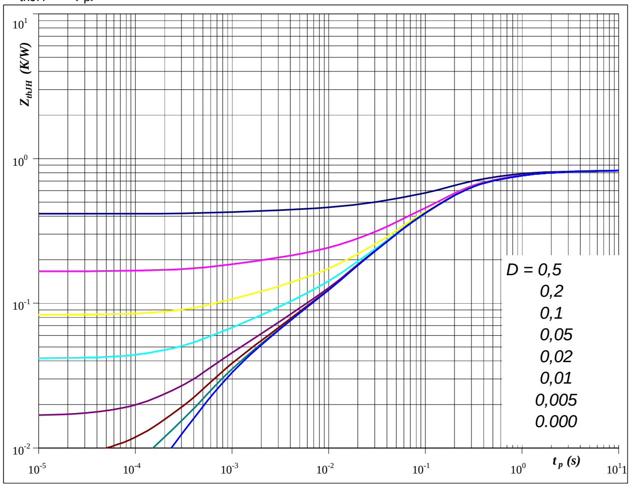
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	128	Ω

Figure 19 MOSFET

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	0,83	K/W

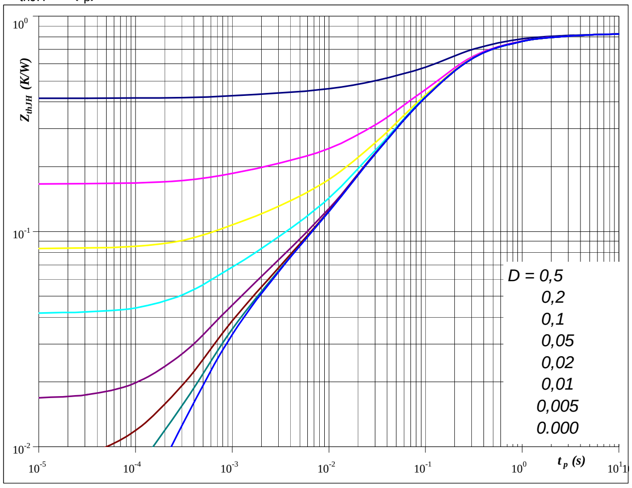
IGBT thermal model values

R (C/W)	Tau (s)
0,03	4,8E+00
0,10	1,1E+00
0,33	2,3E-01
0,26	8,5E-02
0,08	1,3E-02
0,04	1,0E-03

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} =	0,83	K/W

FWD thermal model values

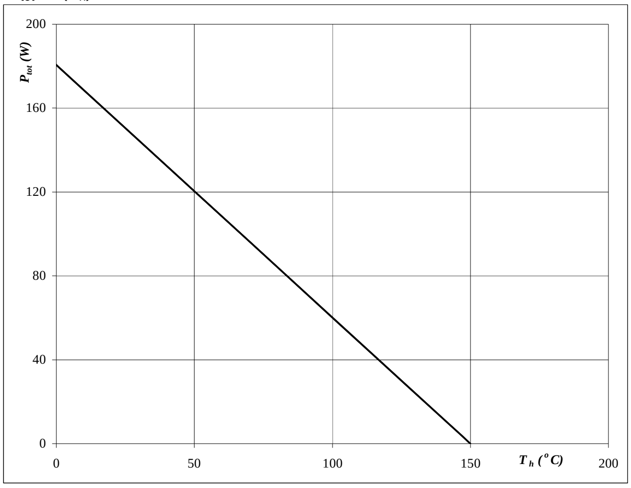
R (C/W)	Tau (s)
0,03	4,8E+00
0,10	1,1E+00
0,33	2,3E-01
0,26	8,5E-02
0,08	1,3E-02
0,04	1,0E-03

H-Bridge

Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



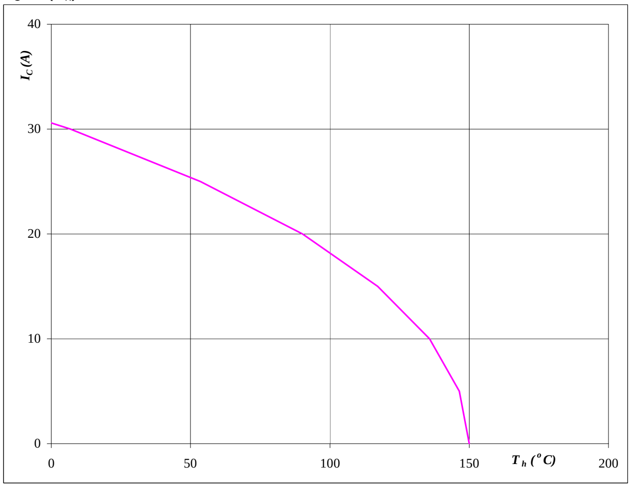
At

T_j = 150 °C

Figure 22 MOSFET

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

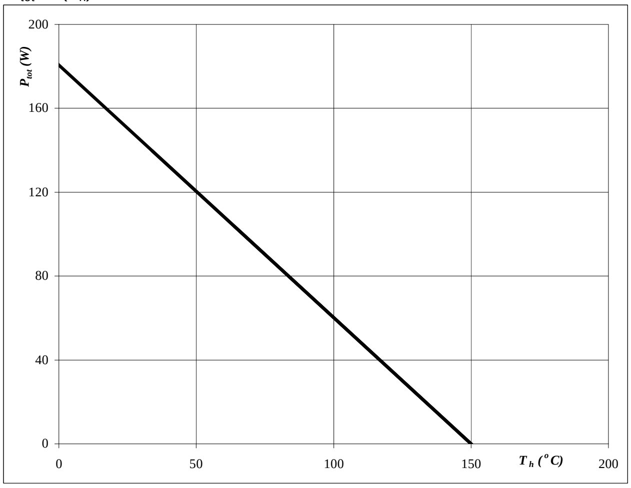
T_j = 150 °C

V_{GE} = 15 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



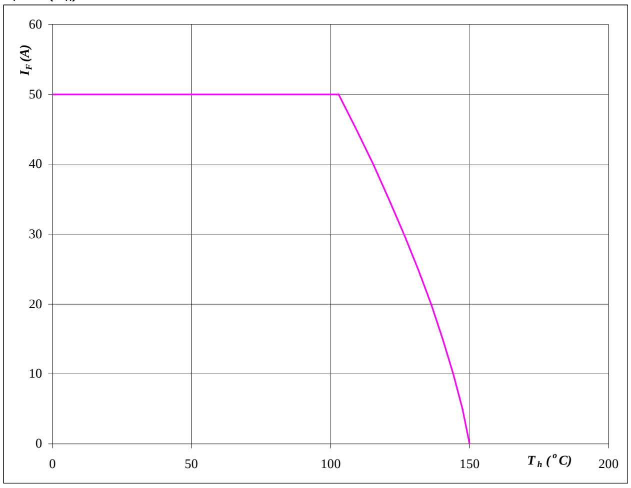
At

T_j = 150 °C

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

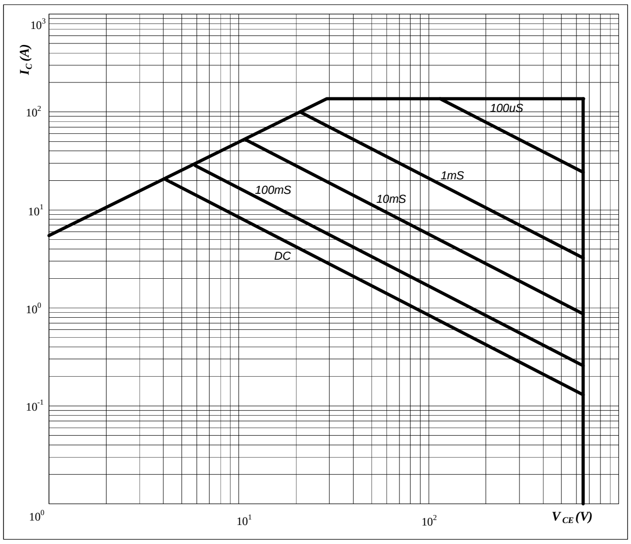
T_j = 150 °C

H-Bridge

Figure 25 MOSFET

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



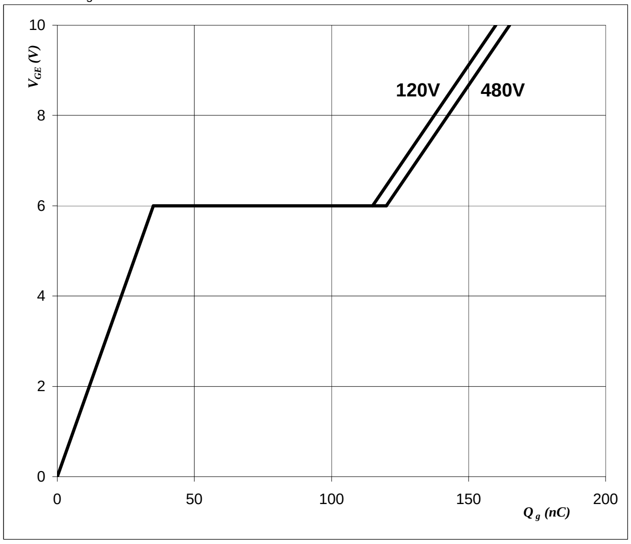
At

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

Figure 26 MOSFET

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



At

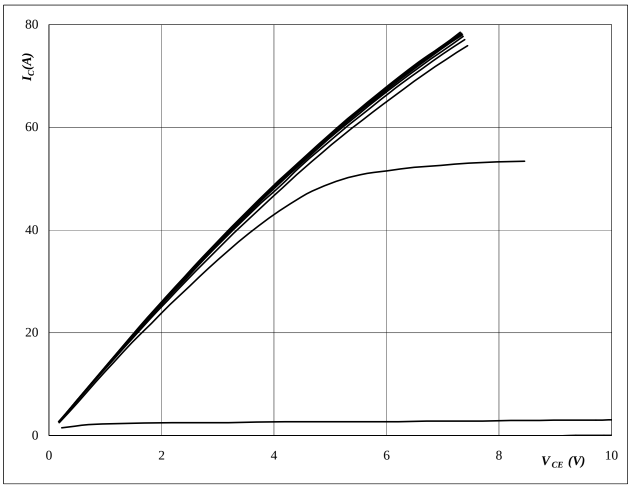
I_C =	43	A

INPUT BOOST

Figure 1 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



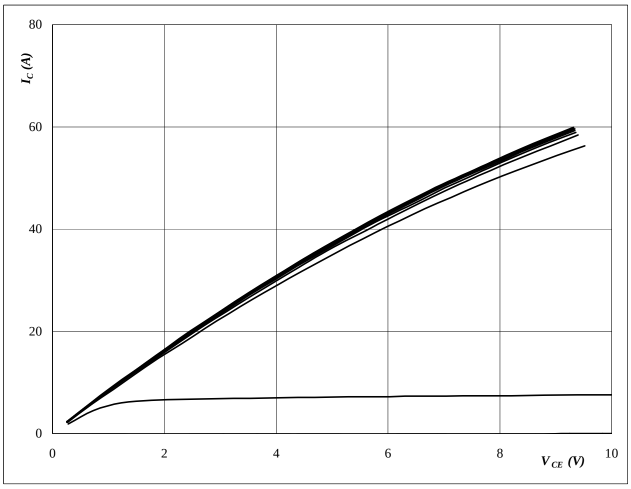
At

t_p =	250	µs
T_j =	25	°C
V_{GS} from	0 V to 20 V in steps of 2 V	

Figure 2 BOOST MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



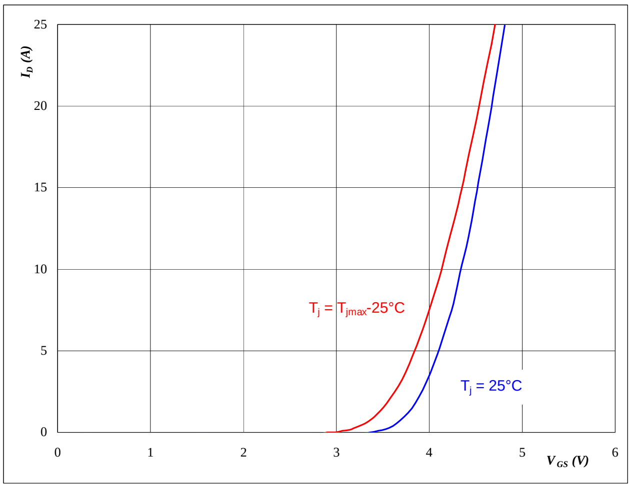
At

t_p =	250	µs
T_j =	125	°C
V_{GS} from	0 V to 20 V in steps of 2 V	

Figure 3 BOOST MOSFET

Typical transfer characteristics

$I_D = f(V_{GS})$



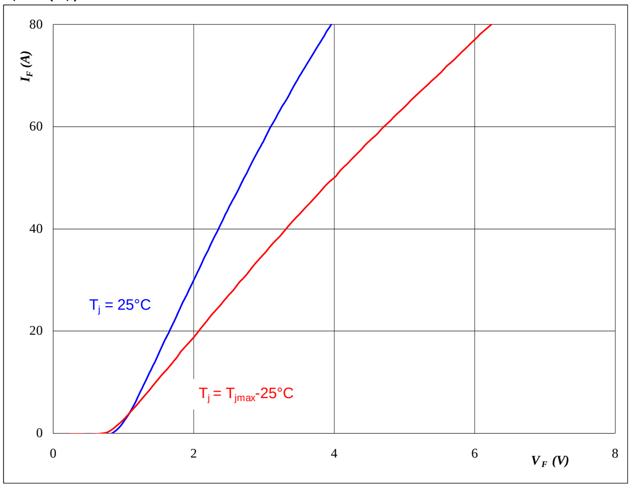
At

t_p =	250	µs
V_{DS} =	10	V

Figure 4 BOOST FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

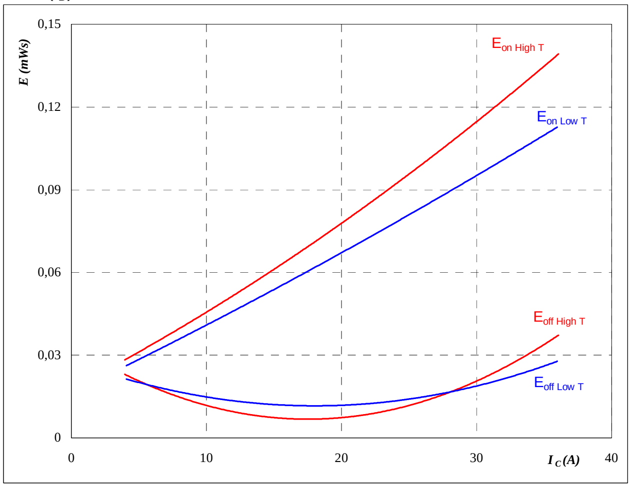
t_p =	250	µs

INPUT BOOST

Figure 5 BOOST MOSFET

Typical switching energy losses as a function of collector current

$E = f(I_D)$



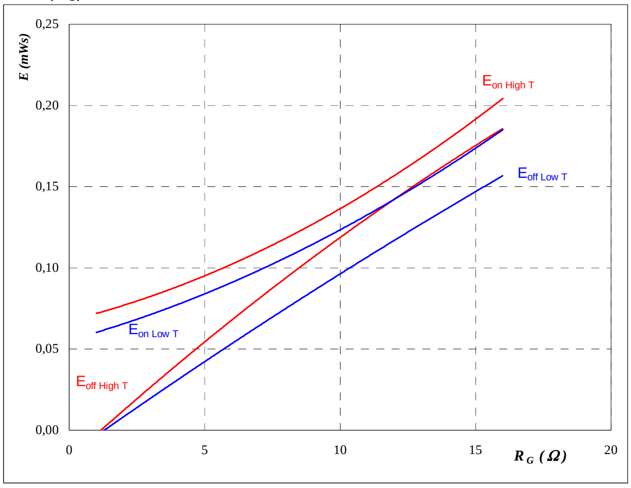
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 6 BOOST MOSFET

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



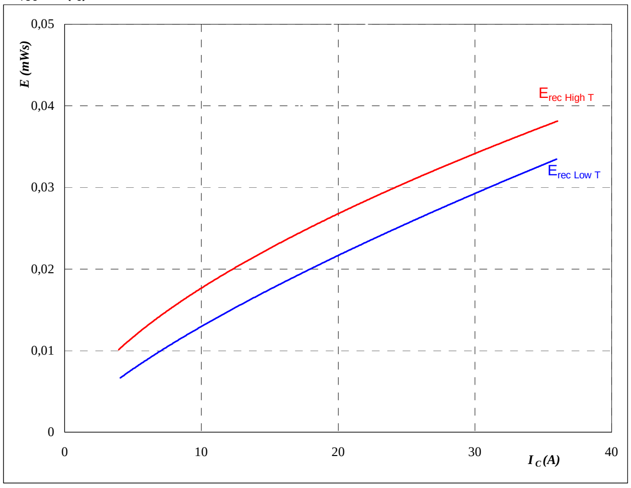
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	10	V
I_D =	20	A

Figure 7 BOOST FWD

Typical reverse recovery energy loss as a function of collector (drain) current

$E_{rec} = f(I_c)$



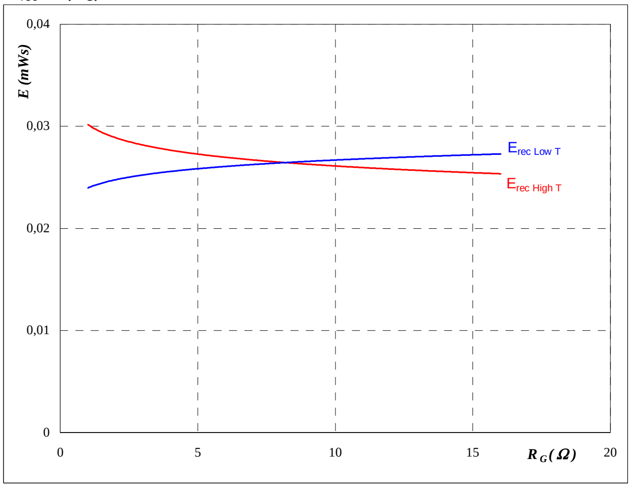
With an inductive load at

T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 8 BOOST FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

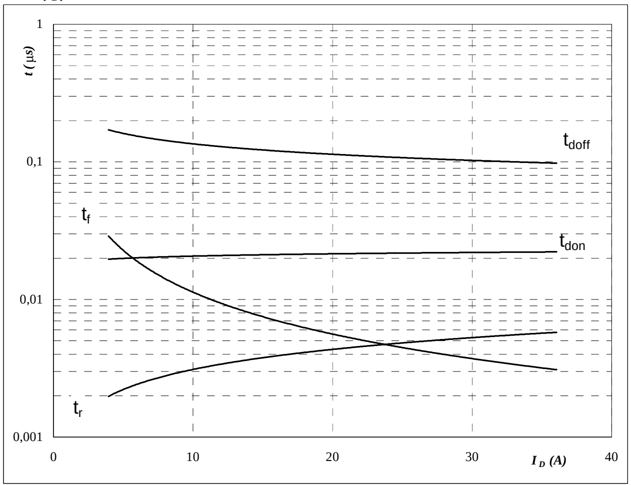
T_j =	25/125	°C
V_{DS} =	400	V
V_{GS} =	10	V
I_D =	20	A

INPUT BOOST

Figure 9 BOOST MOSFET

Typical switching times as a function of collector current

$t = f(I_D)$



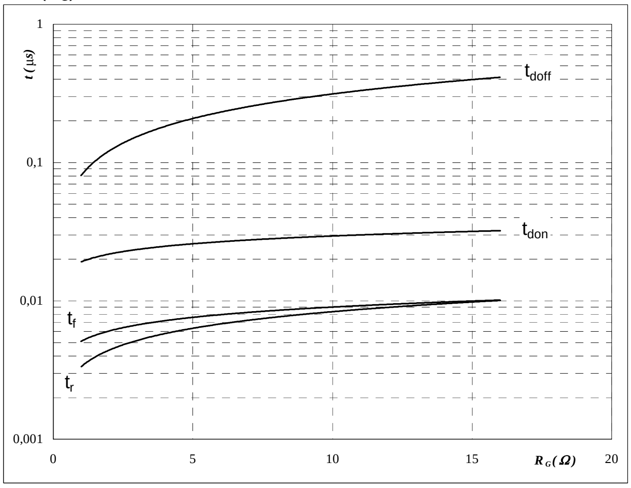
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	10	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Figure 10 BOOST MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



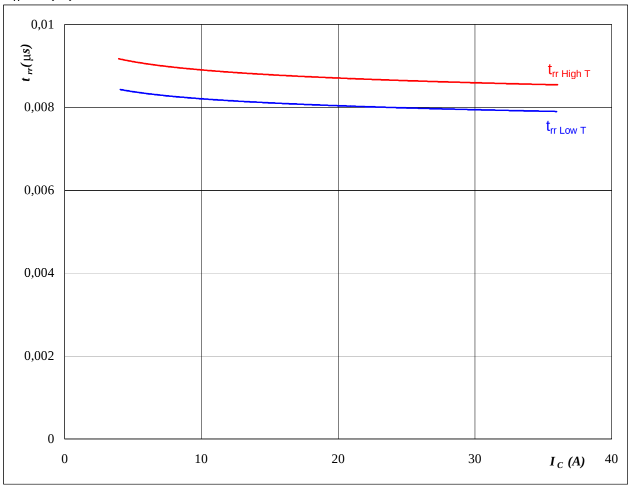
With an inductive load at

T_j =	125	°C
V_{DS} =	400	V
V_{GS} =	10	V
I_C =	20	A

Figure 11 BOOST FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(Ic)$



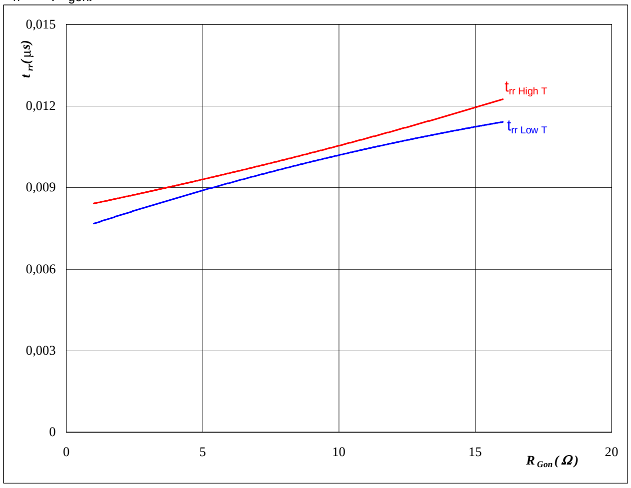
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 12 BOOST FWD

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

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



At

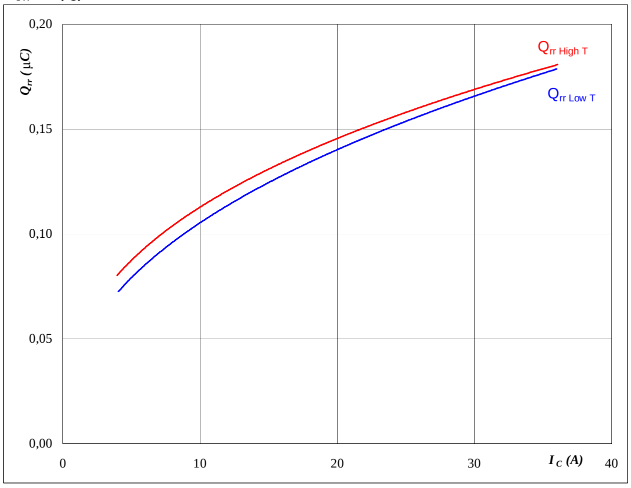
T_j =	25/125	°C
V_R =	400	V
I_F =	20	A
V_{GS} =	10	V

INPUT BOOST

Figure 13 BOOST FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



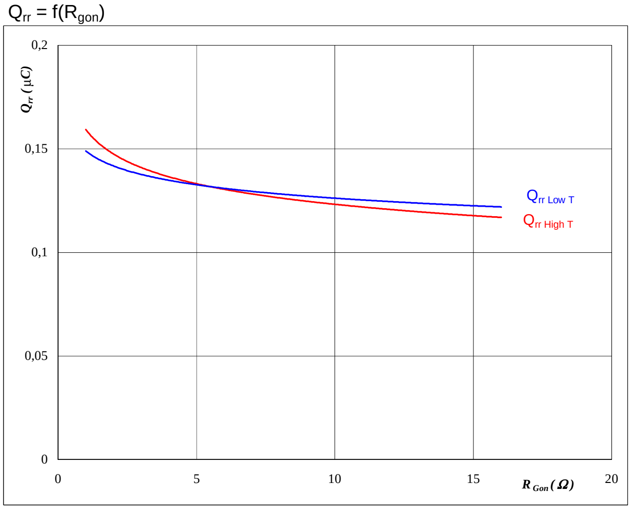
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 14 BOOST FWD

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

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



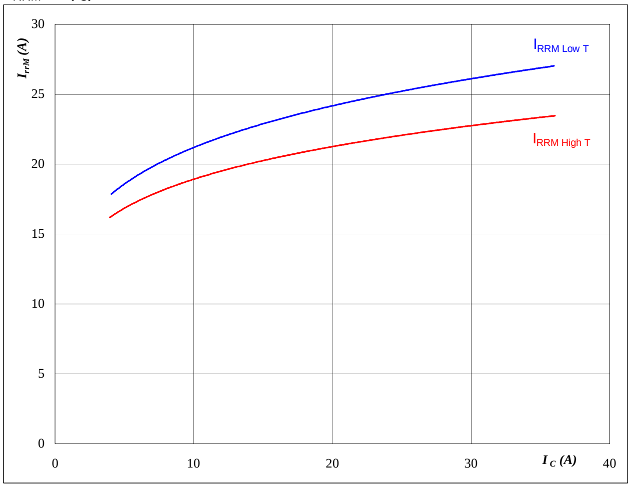
At

Tj =	25/125	°C
VR =	400	V
IF =	20	A
VGS =	10	V

Figure 15 BOOST FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



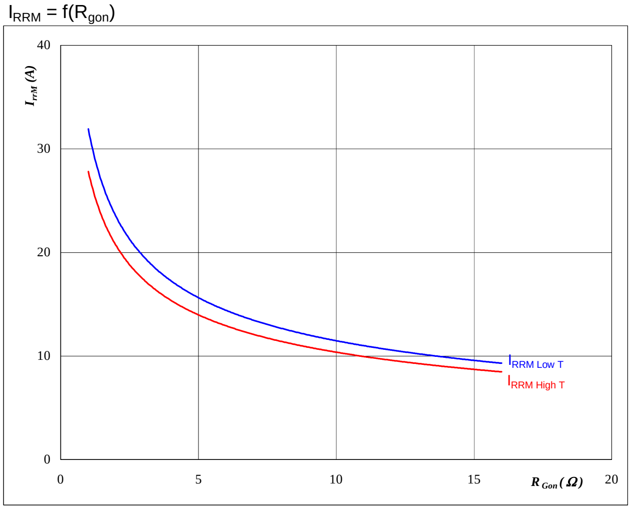
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 16 BOOST FWD

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

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



At

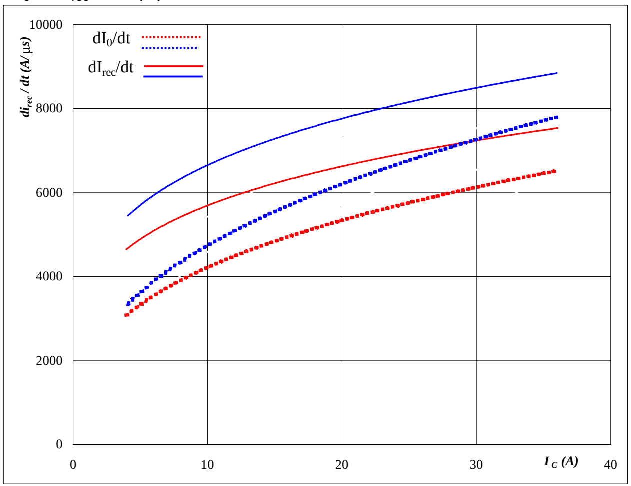
T_j =	25/125	°C
V_R =	400	V
I_F =	20	A
V_{GS} =	10	V

INPUT BOOST

Figure 17 BOOST FWD

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

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



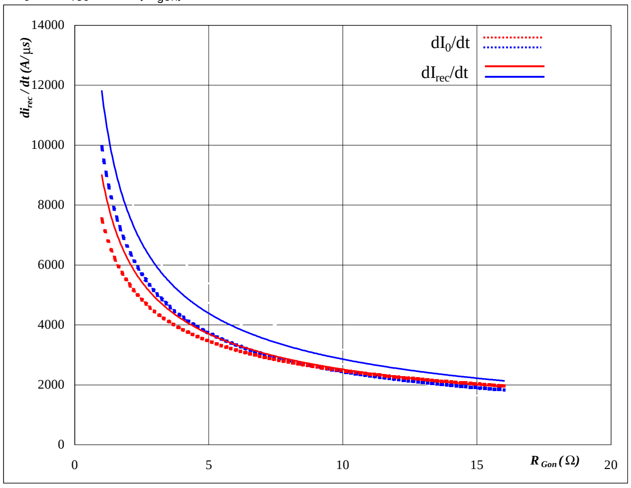
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	2	Ω

Figure 18 BOOST FWD

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

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



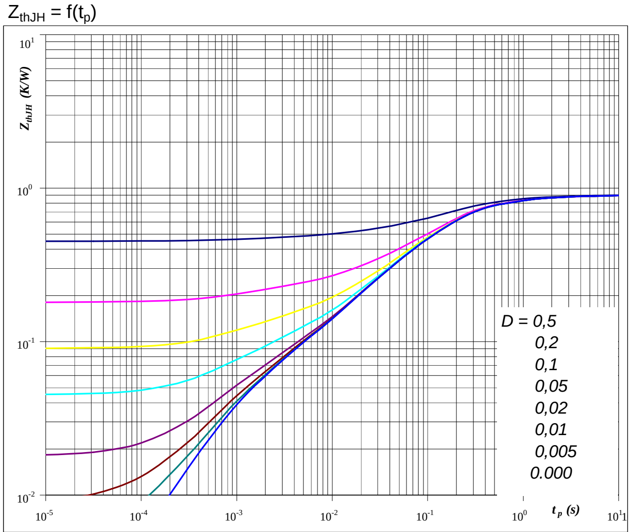
At

Tj =	25/125	°C
VR =	400	V
IF =	20	A
VGS =	10	V

Figure 19 BOOST MOSFET

IGBT/MOSFET transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	0,90	K/W

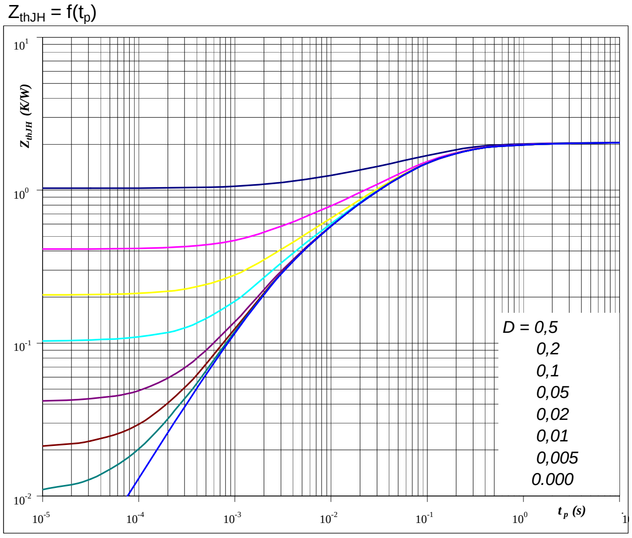
IGBT thermal model values

R (C/W)	Tau (s)
3,43E-02	5,75E+00
1,09E-01	1,04E+00
4,48E-01	1,90E-01
1,86E-01	6,29E-02
8,11E-02	1,23E-02
4,45E-02	1,06E-03

Figure 20 BOOST FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	2,06	K/W

FWD thermal model values

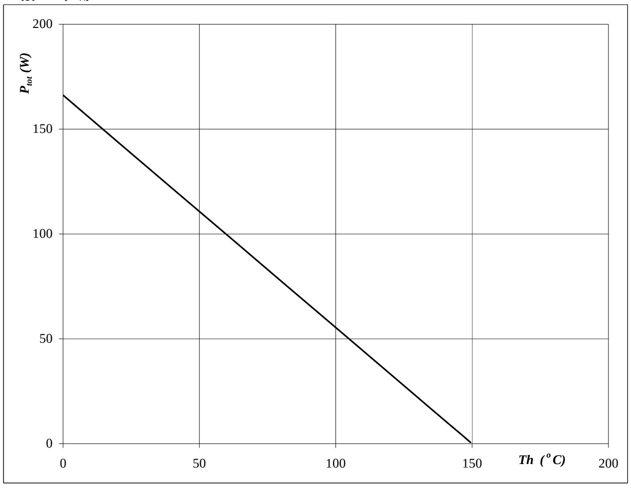
R (C/W)	Tau (s)
3,27E-02	9,23E+00
1,23E-01	1,09E+00
5,18E-01	1,63E-01
7,80E-01	5,62E-02
3,95E-01	1,25E-02
2,09E-01	2,51E-03

INPUT BOOST

Figure 21 BOOST MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



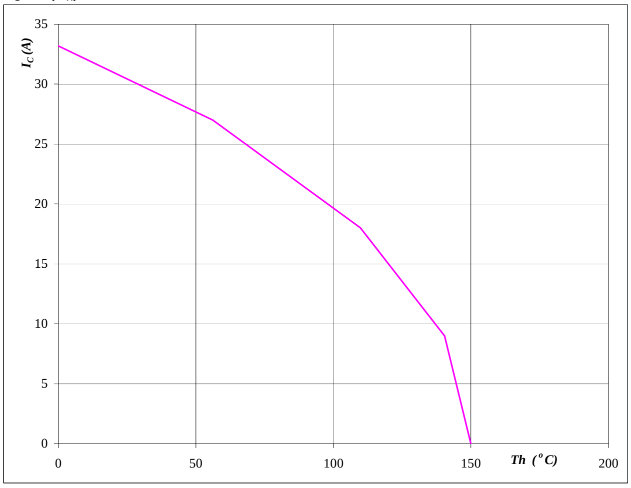
At

T_j = 150 ºC

Figure 22 BOOST MOSFET

Collector/Drain current as a function of heatsink temperature

$I_C = f(T_h)$



At

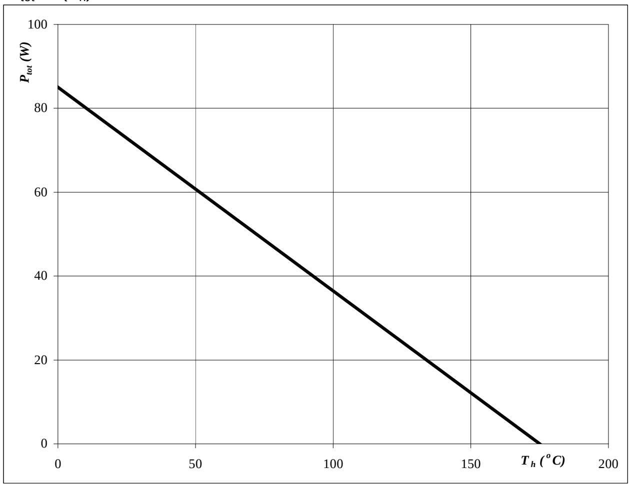
T_j = 150 ºC

V_{GS} = 10 V

Figure 23 BOOST FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



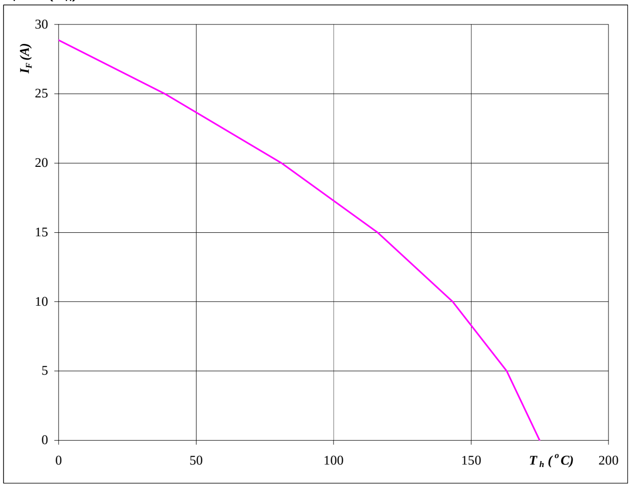
At

T_j = 175 ºC

Figure 24 BOOST FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

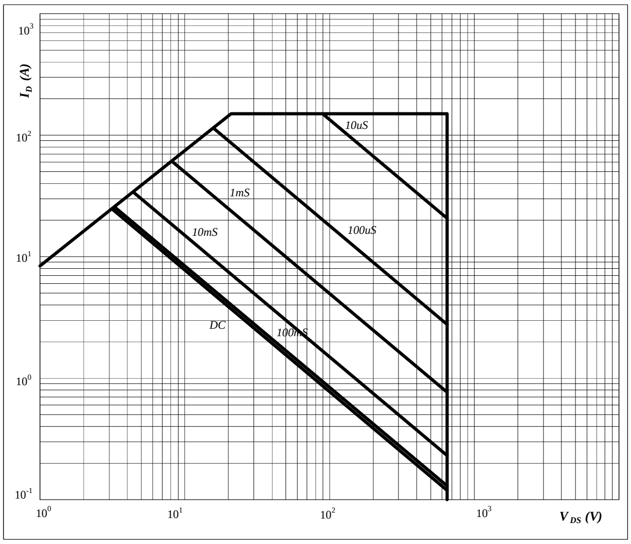
T_j = 175 ºC

INPUT BOOST

Figure 25	BOOST MOSFET

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$



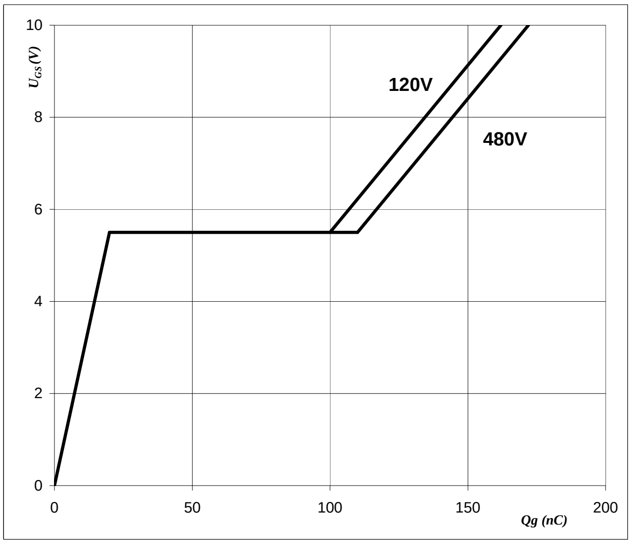
At

D =	single pulse	
T_h =	80	ºC
V_{GS} =	10	V
T_j =	T_{jmax}	ºC

Figure 26	BOOST MOSFET

Gate voltage vs Gate charge

$V_{GS} = f(Qg)$



At

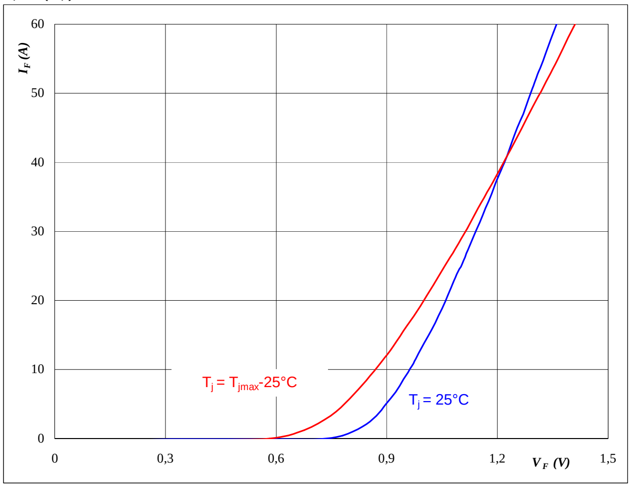
I_D =	20	A

Bypass Diode

Figure 1 Bypass diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



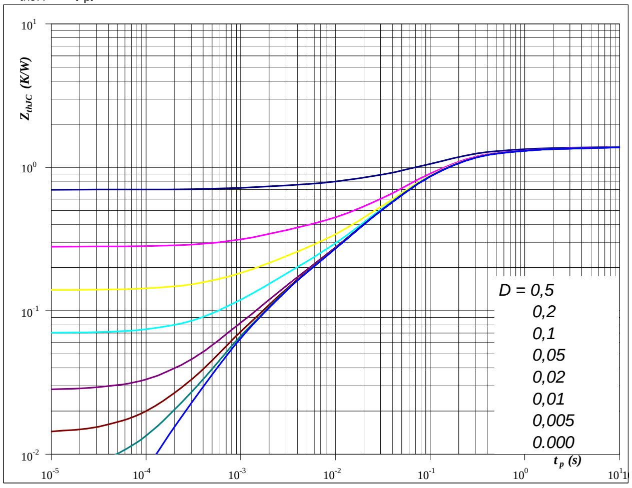
At

t_p = 250 µs

Figure 2 Bypass diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

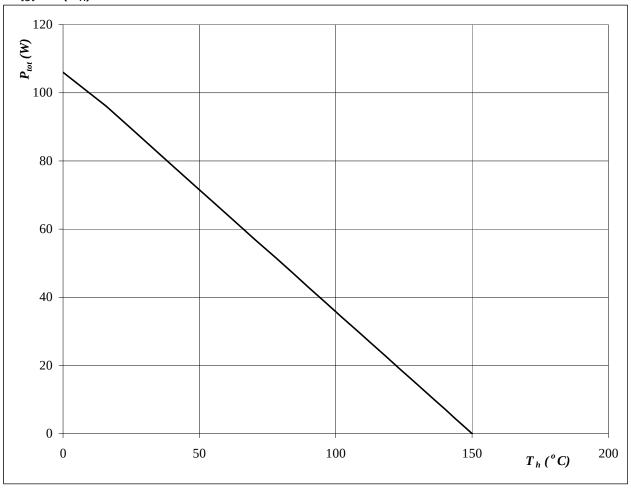
D = t_p / T

R_{thJH} = 1,397 K/W

Figure 3 Bypass diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



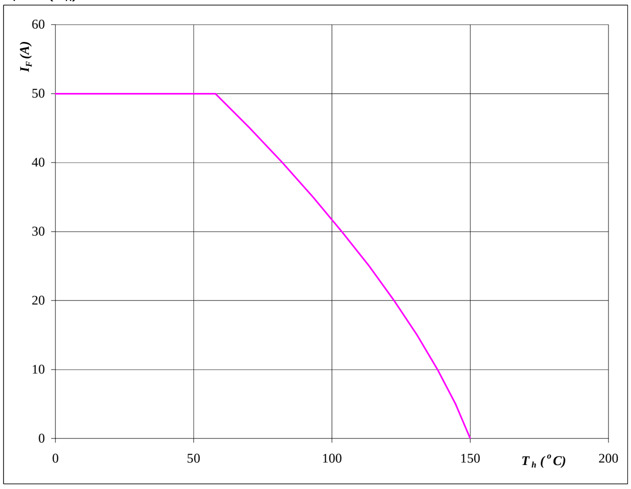
At

T_j = 150 ºC

Figure 4 Bypass diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



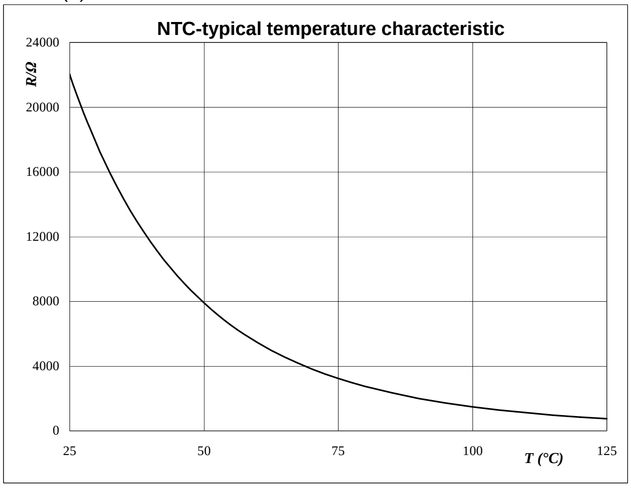
At

T_j = 150 ºC

Thermistor

Figure 1	Thermistor

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



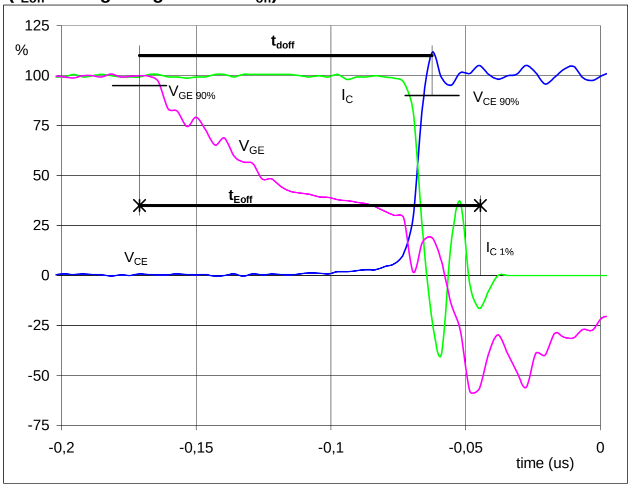
Switching Definitions H-Bridge MOSFET

General conditions

T_j	=	125 °C
R_{gon}	=	128 Ω
R_{goff}	=	2 Ω

Figure 1 H-Bridge MOSFET

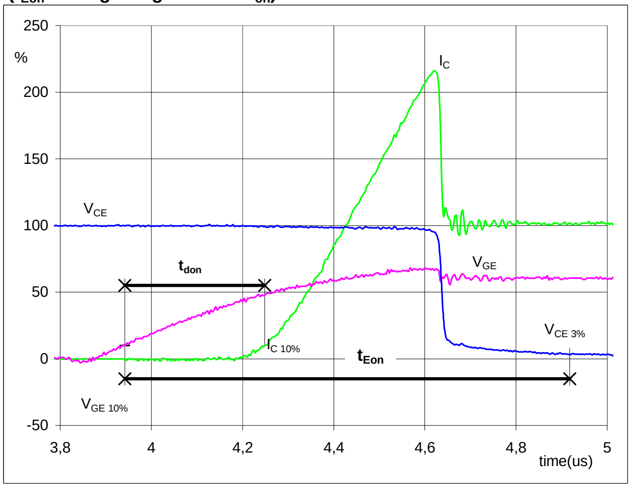
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	400	V
I_C (100%) =	20	A
t_{doff} =	0,10	μs
t_{Eoff} =	0,13	μs

Figure 2 H-Bridge MOSFET

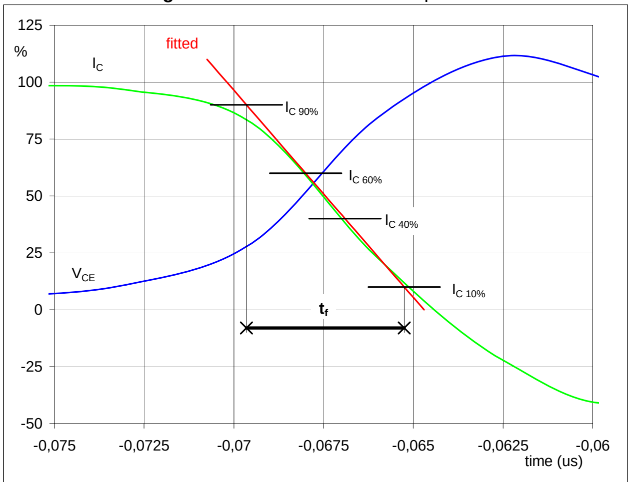
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	400	V
I_C (100%) =	20	A
t_{don} =	0,31	μs
t_{Eon} =	0,98	μs

Figure 3 H-Bridge MOSFET

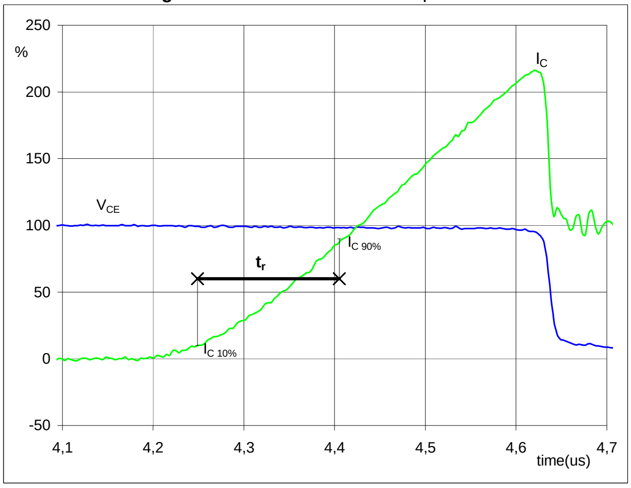
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	400	V
I_C (100%) =	20	A
t_f =	0,01	μs

Figure 4 H-Bridge MOSFET

Turn-on Switching Waveforms & definition of t_r

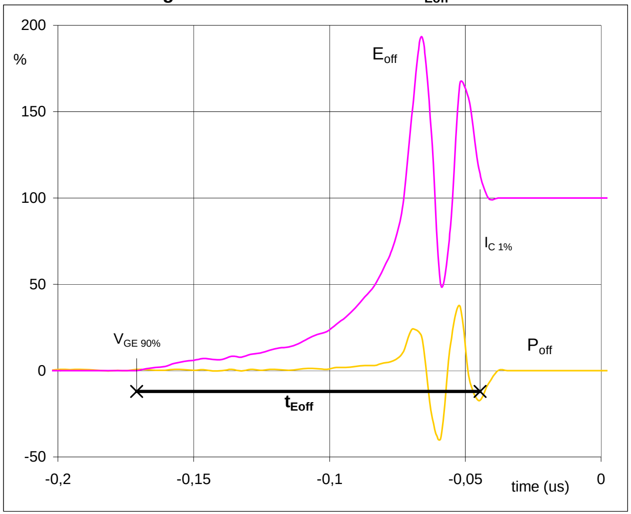


V_C (100%) =	400	V
I_C (100%) =	20	A
t_r =	0,16	μs

Switching Definitions H-Bridge MOSFET

Figure 5 H-Bridge MOSFET

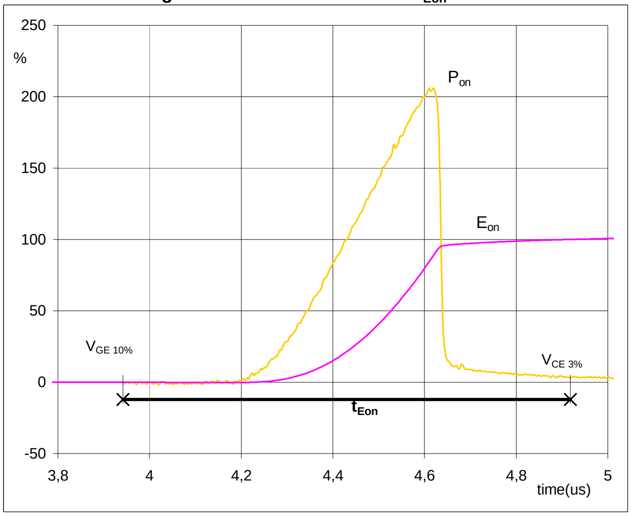
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	8,05	kW
E_{off} (100%) =	0,01	mJ
t_{Eoff} =	0,13	µs

Figure 6 H-Bridge MOSFET

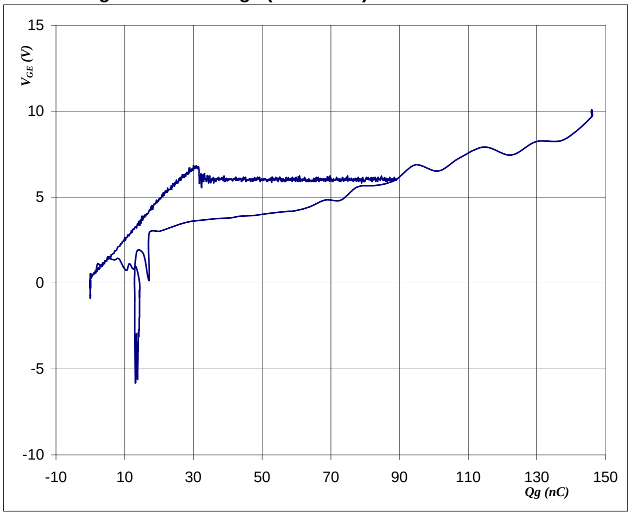
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	8,05	kW
E_{on} (100%) =	3,68	mJ
t_{Eon} =	0,98	µs

Figure 7 H-Bridge MOSFET

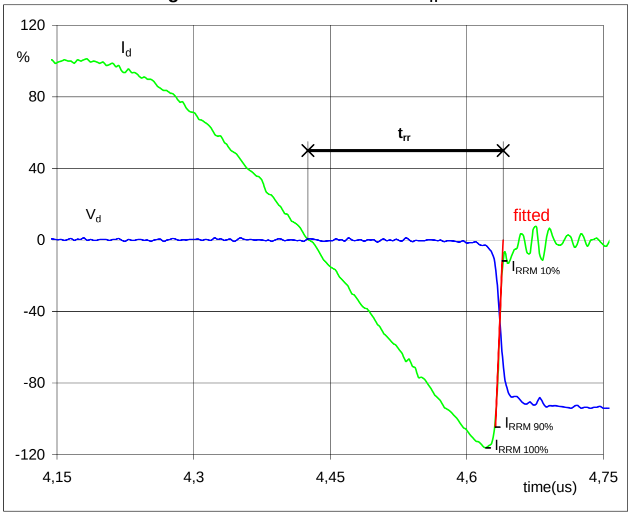
Gate voltage vs Gate charge (measured)



V_{GEoff} =	0	V
V_{GEon} =	10	V
V_C (100%) =	400	V
I_C (100%) =	20	A
Q_g =	145,99	nC

Figure 8 H-Bridge FWD

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

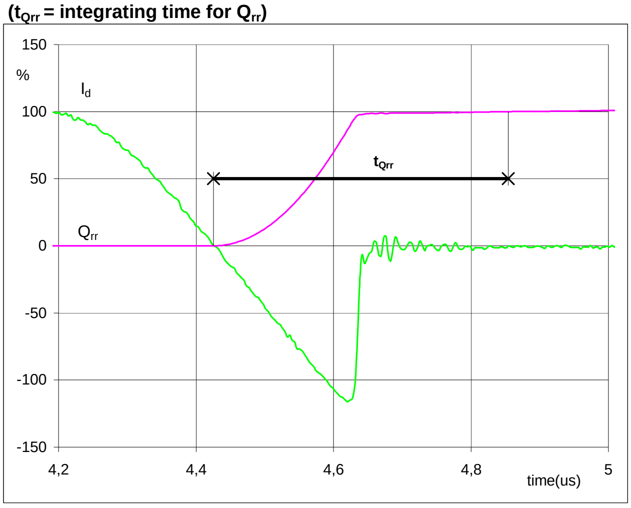


V_d (100%) =	400	V
I_d (100%) =	20	A
I_{RRM} (100%) =	-24	A
t_{rr} =	0,21	µs

Switching Definitions H-Bridge MOSFET

Figure 9 H-Bridge FWD

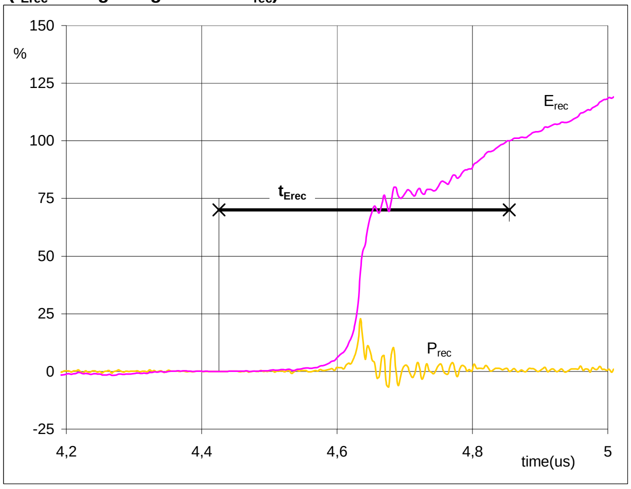
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	20	A
Q_{rr} (100%) =	2,74	µC
t_{Qrr} =	0,43	µs

Figure 10 H-Bridge FWD

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



P_{rec} (100%) =	8,05	kW
E_{rec} (100%) =	0,05	mJ
t_{Erec} =	0,43	µs

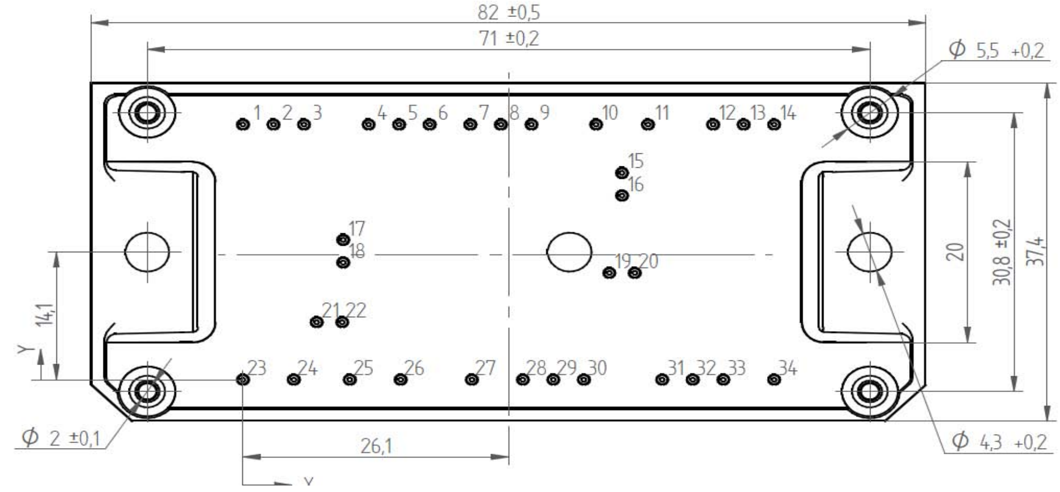
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-FY06BIA080MF-M527E58	M527E58	M527E58

Outline

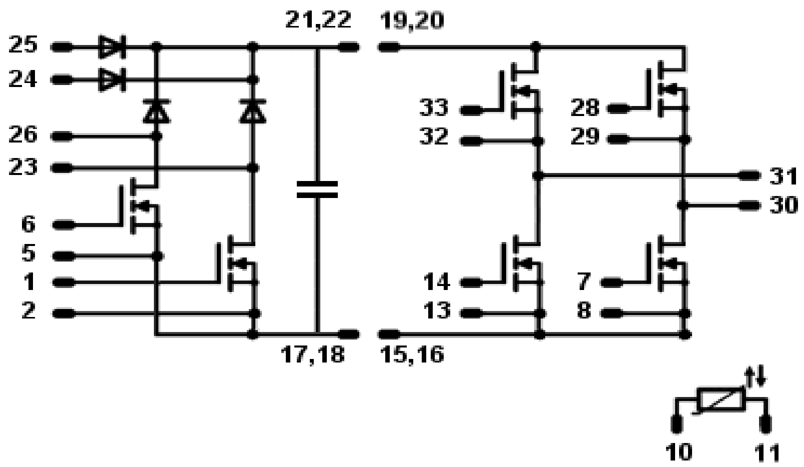
Pin table		
Pin	X	Y
1	0	28,2
2	3	28,2
3	6	28,2
4	12,35	28,2
5	15,35	28,2
6	18,35	28,2
7	22,35	28,2
8	25,35	28,2
9	28,35	28,2
10	34,7	28,2
11	39,8	28,2
12	46,2	28,2
13	49,2	28,2
14	52,2	28,2
15	37,25	22,85
16	37,25	20,35
17	9,85	15,45
18	9,85	12,95
19	36	11,8
20	38,5	11,8
21	7,25	6,35
22	9,75	6,35
23	0	0
24	5	0
25	10,5	0
26	15,5	0
27	22,5	0
28	27,5	0
29	30,5	0
30	33,5	0



Pin table		
Pin	X	Y
31	41,2	0
32	44,2	0
33	47,2	0
34	52,2	0

Tolerance of pinpositions: ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance
PCB cutouts and holes see in handling instructions document

Pinout



Pins 3,4,9,12,27,34 are not connected.

PRODUCT STATUS DEFINITIONS

Datasheet Status	Product Status	Definition
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data may be published at a later date. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.
Final	Full Production	This datasheet contains final specifications. Vincotech reserves the right to make changes at any time without notice in order to improve design. The data contained is exclusively intended for technically trained staff.