flowSOL 0 BI — 600V / 41mOhm

Features

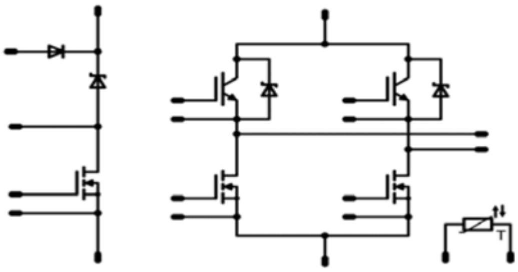
- High efficiency
- Ultra fast switching frequency
- Low inductive design
- SiC in boost

flow0 12mm housing

Target Applications

- Transformerless solar inverters

Schematic



Types

- 10-FZ06BIA041FS01-P898E10

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Bypass FWD					
Repetitive peak reverse voltage	V_{RRM}			1600	V
Forward current per FWD	I_{FAV}	DC current	T_h=80°C T_c=80°C	34 46	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 FWD	P_{tot}	T_j=$T_j$max	T_h=80°C T_c=80°C	39 59	W
Maximum Junction Temperature	$T_j$max			150	°C
Input Boost MOSFET					
Drain to source breakdown voltage	V_{DS}			600	V
DC drain current	I_D	T_j=$T_j$max	T_h=80°C T_c=80°C	32 39	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max		272	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80°C T_c=80°C	98 148	W
Gate-source peak voltage	V_{GS}			±20	V
Maximum Junction Temperature	$T_j$max			150	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Input Boost FWD				
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	24 31	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	171	A
Power dissipation	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	49 74	W
Maximum Junction Temperature	$T_j$max		175	°C
Buck FWD				
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	28 38	A
Repetitive peak forward current	I_{FRM}	t_p limited by $T_j$max	30	A
Power dissipation per FWD	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	45 68	W
Maximum Junction Temperature	$T_j$max		150	°C
Buck MOSFET				
Drain to source breakdown voltage	V_{DS}		600	V
DC drain current	I_D	T_j=$T_j$max T_h=80°C T_c=80°C	32 39	A
Pulsed drain current	I_{Dpulse}	t_p limited by $T_j$max	272	A
Power dissipation	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	98 148	W
Gate-source peak voltage	Vgs		±20	V
Maximum Junction Temperature	$T_j$max		150	°C
Polarity Switch IGBT				
Collector-emitter break down voltage	V_{CE}		600	V
DC collector current	I_C	T_j=$T_j$max T_h=80°C T_c=80°C	45 45	A
Repetitive peak collector current	I_{Cpuls}	t_p limited by $T_j$max	150	A
Power dissipation per IGBT	P_{tot}	T_j=$T_j$max T_h=80°C T_c=80°C	84 128	W
Gate-emitter peak voltage	V_{GE}		±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V	6 360	μs V
Maximum Junction Temperature	$T_j$max		175	°C

Maximum Ratings

Tj=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
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 FWD										
Forward voltage	solar inverte				35	Tj=25°C Tj=125°C	0,7	1,18 1,15	1,3	V
Threshold voltage (for power loss calc. only)	V_{to}				35	Tj=25°C Tj=125°C		0,89 0,79		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			0,15	mA
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal foil thickness=76um Kunze foil KU-ALF5						1,80		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,19		
Input Boost MOSFET										
Static drain to source ON resistance	$R_{DS(on)}$		10		44	Tj=25°C Tj=125°C		0,043 0,086		Ω
Gate threshold voltage	$V_{(GS)th}$	$V_{GS}=V_{DS}$			0,00296	Tj=25°C Tj=125°C	2,4	3	3,6	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	400		Tj=25°C Tj=125°C			5000	nA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=8 Ω Rgon=8 Ω	10	400	15	Tj=25°C Tj=125°C		34 33		ns
Rise Time	t_r					Tj=25°C Tj=125°C		8 10		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		276 300		
Fall time	t_f					Tj=25°C Tj=125°C		87 93		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,20 0,15		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,06 0,07		
Total gate charge	Q_g		0/10	480	44	Tj=25°C Tj=125°C		290		nC
Gate to source charge	Q_{gs}					Tj=25°C Tj=125°C		36		
Gate to drain charge	Q_{gd}					Tj=25°C Tj=125°C		150		
Input capacitance	C_{iss}	f=1MHz	0	100		Tj=25°C		6530		pF
Output capacitance	C_{oss}							360		
Reverse transfer capacitance	C_{rss}							tbd.		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal foil thickness=76um Kunze foil KU-ALF5						0,72		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,47		
Input Boost FWD										
Forward voltage	V_F				24	Tj=25°C Tj=150°C	1	1,56 1,82	1,9	V
Reverse leakage current	I_{rm}		10	400	15	Tj=25°C Tj=150°C			150	μA
Peak recovery current	I_{RRM}	Rgon=8 Ω	10	400	15	Tj=25°C Tj=150°C		18 8		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=150°C		15 14		ns
Reverse recovery charge	Q_{rr}					Tj=25°C Tj=150°C		0,24 0,13		μC
Reverse recovered energy	E_{rec}					Tj=25°C Tj=150°C		0,04 0,03		mWs
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=150°C		4809 1562		A/μs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal foil thickness=76um Kunze foil KU-ALF5						1,95		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,28		

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	
Buck FWD										
FWD forward voltage	V_F				30	Tj=25°C Tj=125°C	1,5	2,58 1,80	2,8	V
Peak reverse recovery current	I_{RRM}	Rgon=8 Ω	10	400	15	Tj=25°C Tj=125°C		10 29		A
Reverse recovery time	t_{rr}					Tj=25°C Tj=125°C		11 38		ns
Reverse recovered charge	Q_{rr}					Tj=25°C Tj=125°C		0,12 0,62		µC
Peak rate of fall of recovery current	di(rec)max /dt					Tj=25°C Tj=125°C		2478 1706		A/µs
Reverse recovered energy	Erec					Tj=25°C Tj=125°C		0,03 0,08		mWs
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal foil thickness=76um Kunze foil KU-ALF5						1,57		K/W
Thermal resistance chip to case per chip	R_{thJC}							1,03		
Buck MOSFET										
Static drain to source ON resistance	$R_{ds(on)}$		10		44	Tj=25°C Tj=125°C		43 86		mΩ
Gate threshold voltage	$V_{(GS)th}$			$V_{DS}=V_{GS}$	0,00296	Tj=25°C Tj=125°C	2,4	3	3,6	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	400		Tj=25°C Tj=125°C			5000	nA
Turn On Delay Time	$t_{d(ON)}$	Rgoff=8 Ω Rgon=8 Ω	10	400	15	Tj=25°C Tj=125°C		34 33		ns
Rise Time	t_r					Tj=25°C Tj=125°C		9 9,4		
Turn off delay time	$t_{d(OFF)}$					Tj=25°C Tj=125°C		275 302		
Fall time	t_f					Tj=25°C Tj=125°C		139,2 4,5		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=125°C		0,138 0,355		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=125°C		0,055 0,075		
Total gate charge	Q_g		0/10	480	44	Tj=25°C		290		nC
Gate to source charge	Q_{gs}							36		
Gate to drain charge	Q_{gd}							150		
Input capacitance	C_{iss}	f=1MHz	0	100		Tj=25°C		6530		pF
Output capacitance	C_{oss}							360		
Reverse transfer capacitance	C_{rss}							tbd.		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal foil thickness=76um Kunze foil KU-ALF5						0,72		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,47		

Characteristic Values

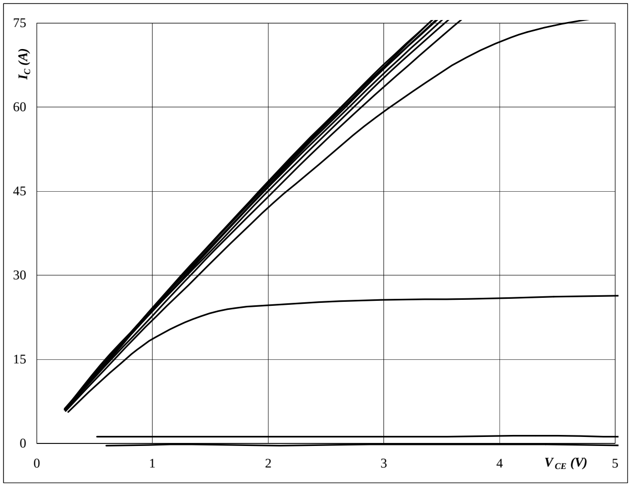
Parameter	**Symbol**	**Conditions**					**Value**			**Unit**
			V_{GE} [V] or V_{GS} [V]	**V_r [V] or V_{CE} [V] or V_{DS} [V]**	**I_C [A] or I_F [A] or I_D [A]**	**T_j**	**Min**	**Typ**	**Max**	
Polarity Switch IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	V_{CE}=V_{GE}			0,00043	Tj=25°C Tj=150°C	5	5,8	6,5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		50	Tj=25°C Tj=150°C	1	1,58 1,78	2,05	V
Collector-emitter cut-off incl FWD	I_{CES}		0	600		Tj=25°C Tj=150°C			0,2	mA
Gate-emitter leakage current	I_{GES}		20	0		Tj=25°C Tj=150°C			650	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	Rgoff=8 Ω Rgon=8 Ω				Tj=25°C Tj=150°C		na. na.		ns
Rise time	t_r					Tj=25°C Tj=150°C		na. na.		
Turn-off delay time	$t_{d(off)}$					Tj=25°C Tj=150°C		na. na.		
Fall time	t_f					Tj=25°C Tj=150°C		na. na.		
Turn-on energy loss per pulse	E_{on}					Tj=25°C Tj=150°C		na. na.		mWs
Turn-off energy loss per pulse	E_{off}					Tj=25°C Tj=150°C		na. na.		
Input capacitance	C_{ies}	f=1MHz	0	25		Tj=25°C		3140		pF
Output capacitance	C_{oss}							200		
Reverse transfer capacitance	C_{rss}							93		
Gate charge	Q_{Gate}		15	480	50	Tj=25°C		310		nC
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness≤50um λ = 1 W/mK						1,13		K/W
Thermal resistance chip to case per chip	R_{thJC}							0,74		
Thermistor										
Rated resistance*	R_{25}					Tj=25°C	17,5	22	29	kΩ
Deviation of R100	$D_{R/R}$	R100=1503Ω				Tc=100°C				%/K
Power dissipation	P					Tj=25°C		210		mW
B-value	$B_{(25/100)}$	Tol. ±3%				Tj=25°C		4000		K

Buck

Figure 1 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



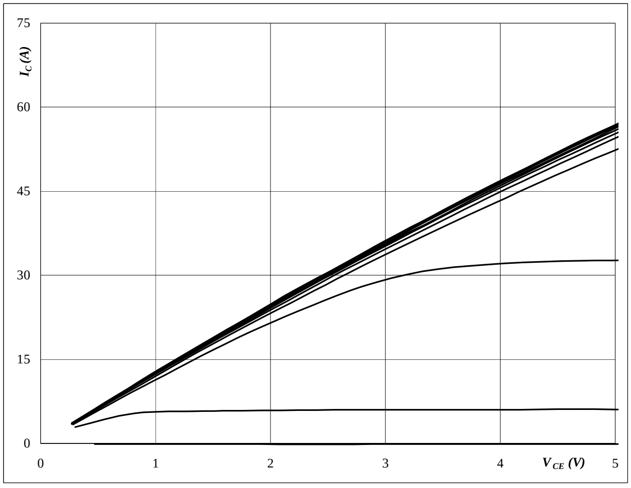
At

t_p =	250	μs
T_j =	25	°C
V_{GE} from	3 V to 13 V in steps of 1 V	

Figure 2 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$



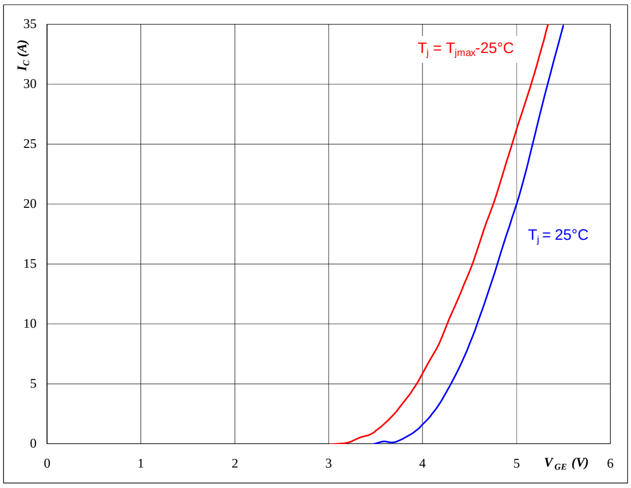
At

t_p =	250	μs
T_j =	125	°C
V_{GE} from	3 V to 13 V in steps of 1 V	

Figure 3 MOSFET

Typical transfer characteristics

$I_C = f(V_{GE})$



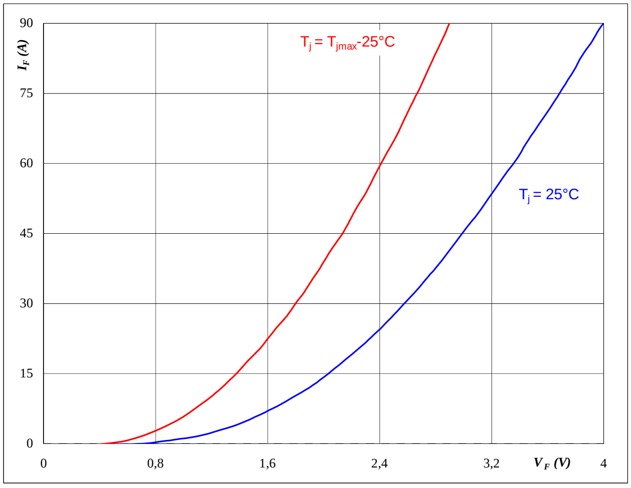
At

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

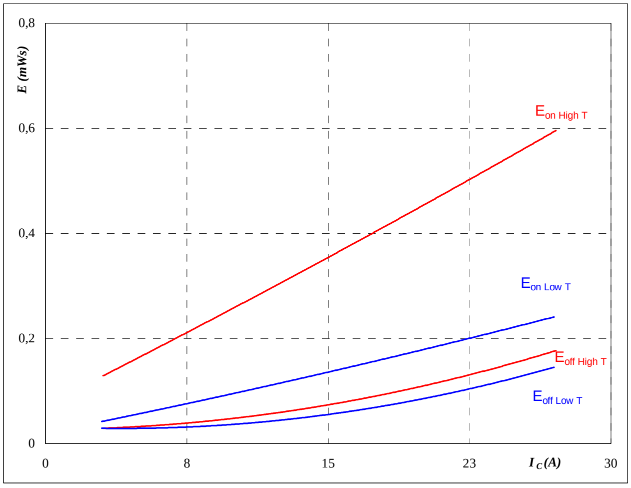
t_p =	250	μs

Buck

Figure 5 MOSFET

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



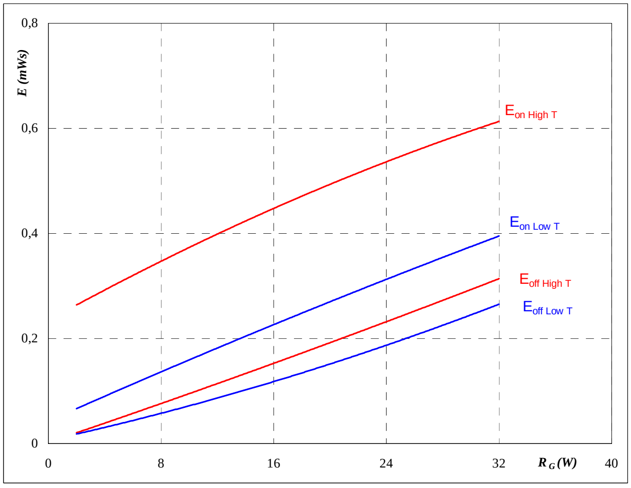
With an inductive load at

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 6 MOSFET

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



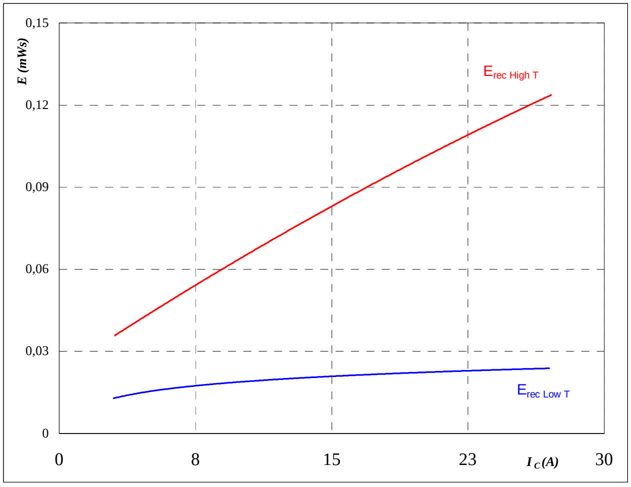
With an inductive load at

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
I_C = 15 A

Figure 7 FWD

Typical reverse recovery energy loss
as a function of collector current

$E_{rec} = f(I_c)$



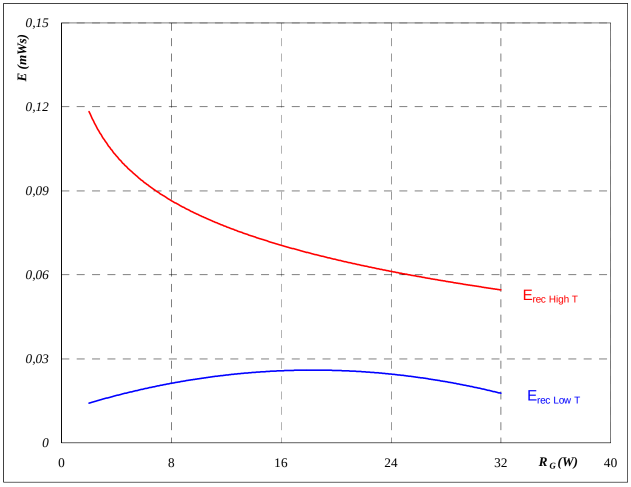
With an inductive load at

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 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

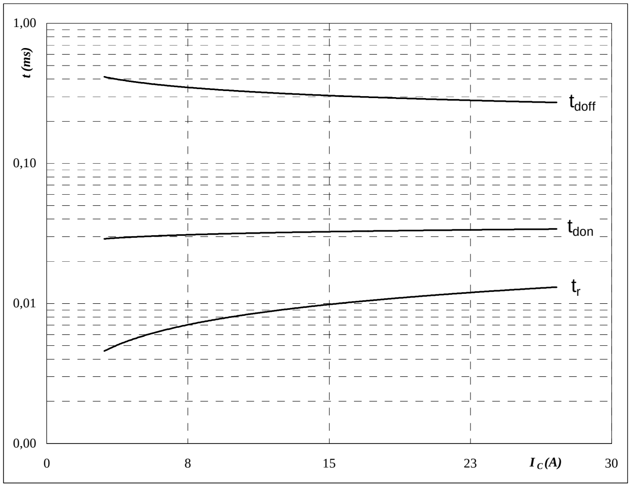
T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
I_C = 15 A

Buck

Figure 9 MOSFET

Typical switching times as a function of collector current

$t = f(I_C)$



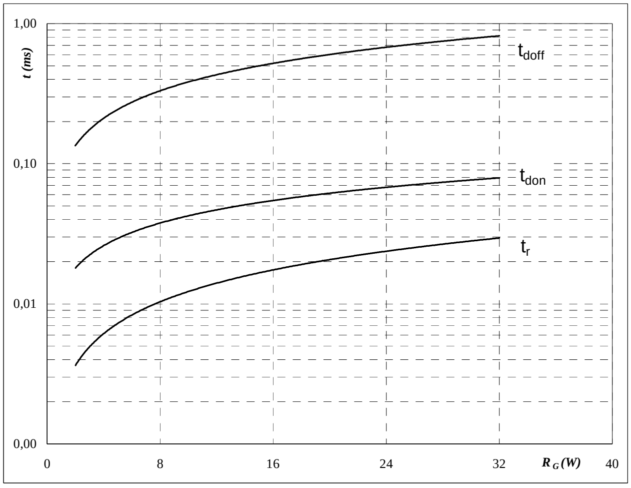
With an inductive load at

T_j = 125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 10 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



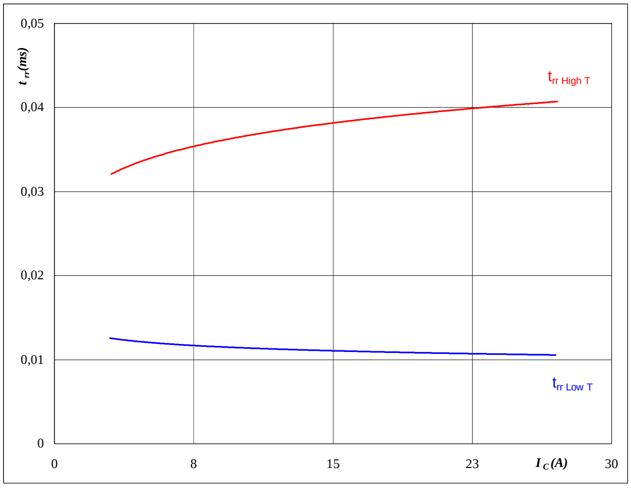
With an inductive load at

T_j = 125 °C
V_{CE} = 400 V
V_{GE} = 10 V
I_C = 15 A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(Ic)$



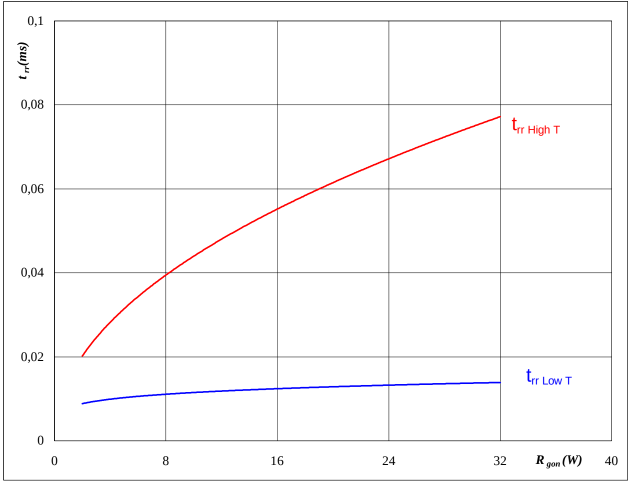
At

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 12 FWD

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

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



At

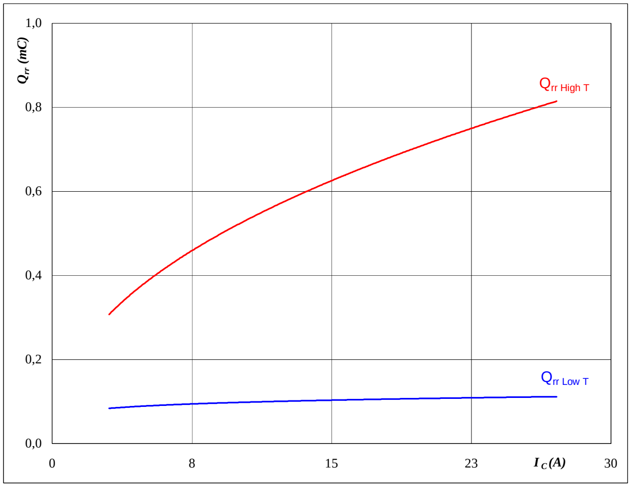
T_j = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GE} = 10 V

Buck

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



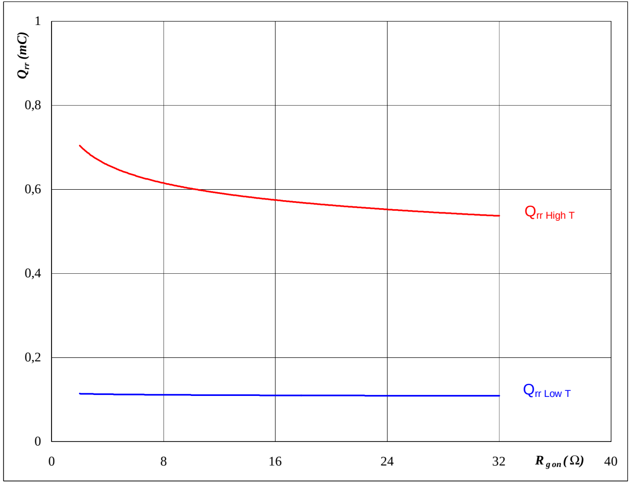
At

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 14 FWD

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

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



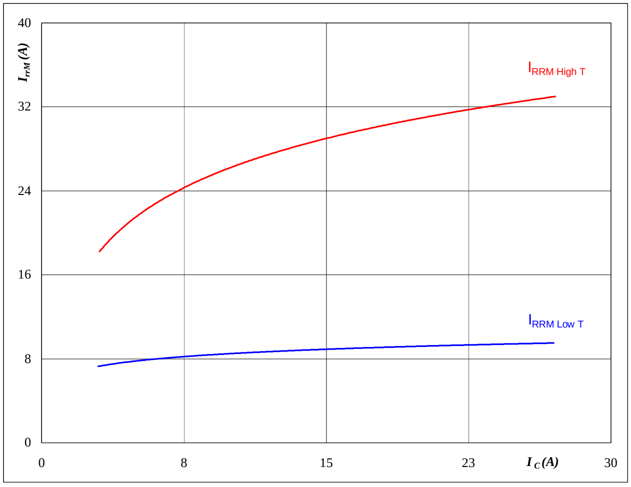
At

T_j = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GE} = 10 V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



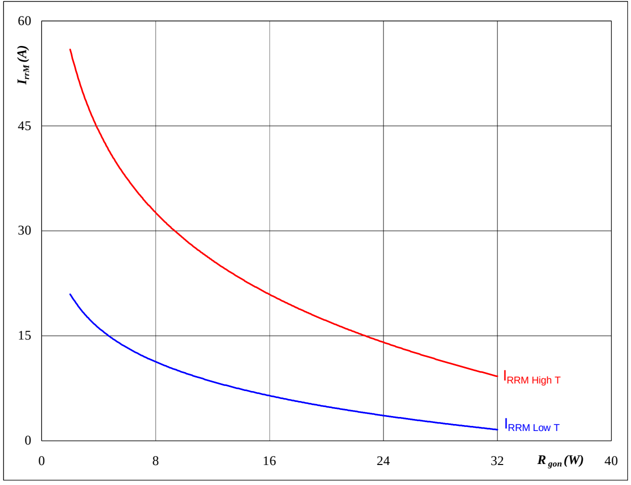
At

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 16 FWD

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

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



At

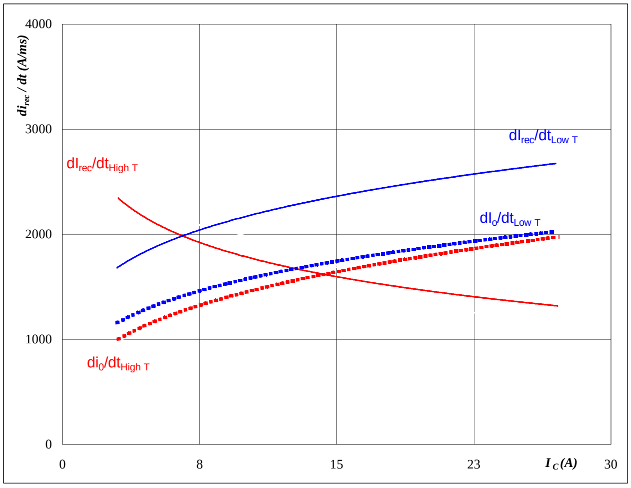
T_j = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GE} = 10 V

Buck

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 °C

$V_{CE} =$ 400 V

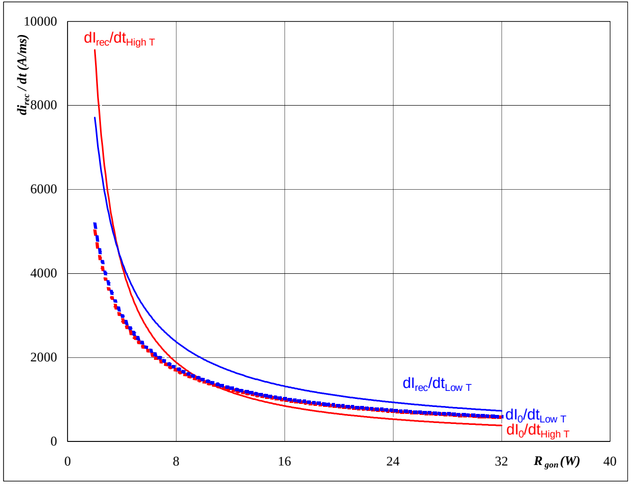
$V_{GE} =$ 10 V

$R_{gon} =$ 8 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 °C

$V_R =$ 400 V

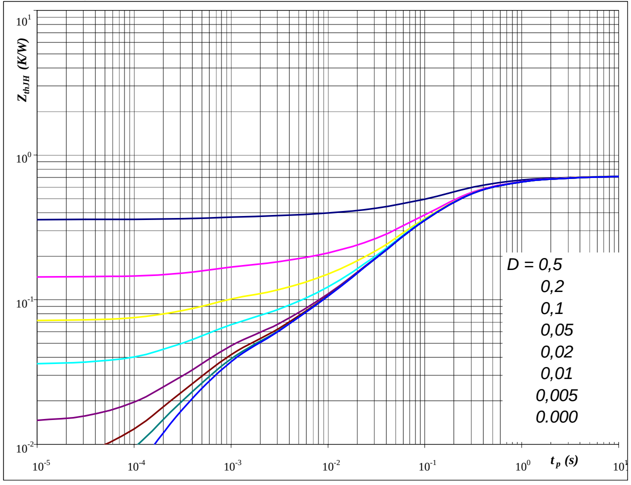
$I_F =$ 15 A

$V_{GE} =$ 10 V

Figure 19 MOSFET

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D = t_p / T

$R_{thJH} =$ 0,72 K/W

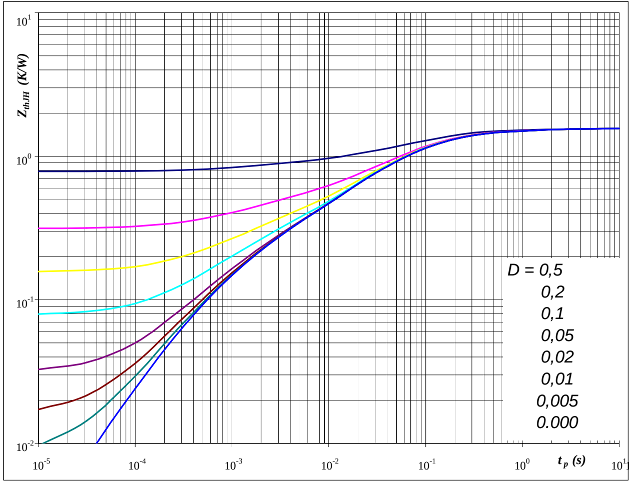
IGBT thermal model values

R (C/W)	Tau (s)
0,02	8,7E+00
0,10	1,3E+00
0,37	2,0E-01
0,15	6,0E-02
0,04	8,2E-03
0,03	5,7E-04

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D = t_p / T

$R_{thJH} =$ 1,57 K/W

FWD thermal model values

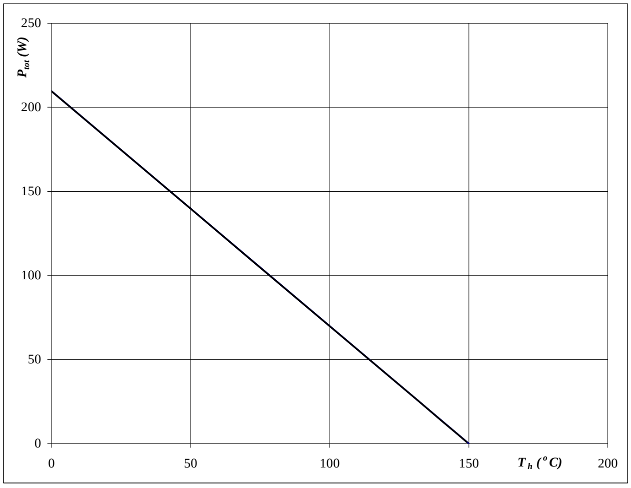
R (C/W)	Tau (s)
0,06	3,6E+00
0,18	4,9E-01
0,76	8,0E-02
0,35	1,6E-02
0,16	1,9E-03
0,06	3,9E-04

Buck

Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



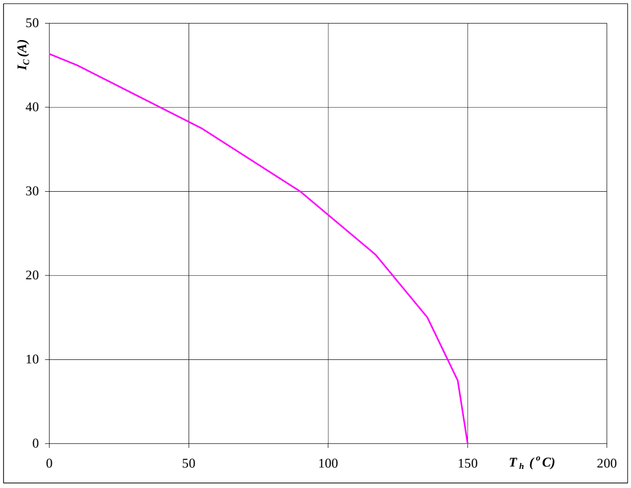
At

T_j = 150 °C

Figure 22 MOSFET

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

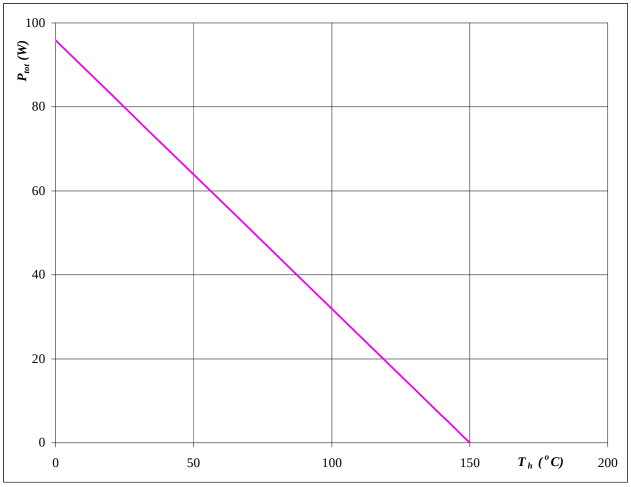
T_j = 150 °C

V_{GE} = 10 V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



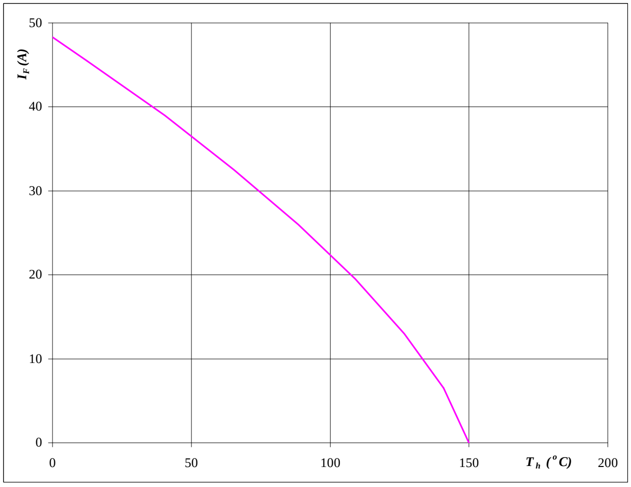
At

T_j = 150 °C

Figure 24 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

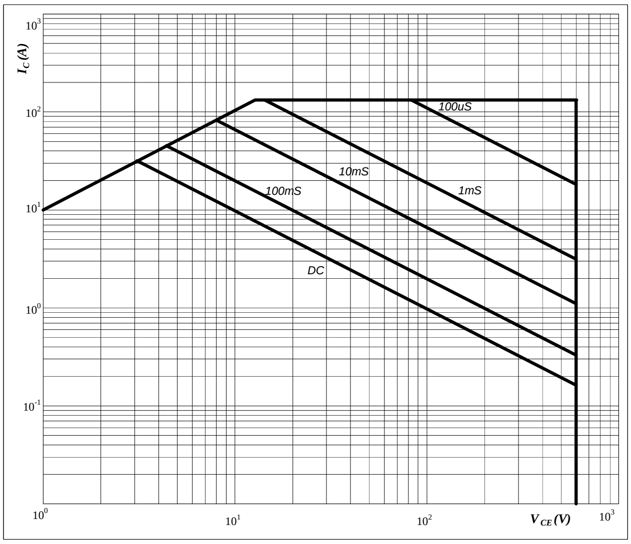
T_j = 150 °C

Buck

Figure 25 MOSFET

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



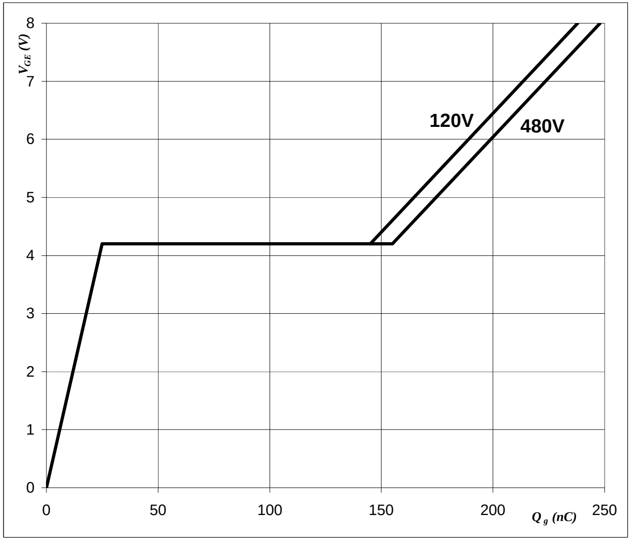
At

D = single pulse
Th = 80 ºC
V_{GE} = 10 V
T_j = T_{jmax} ºC

Figure 26 MOSFET

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



At

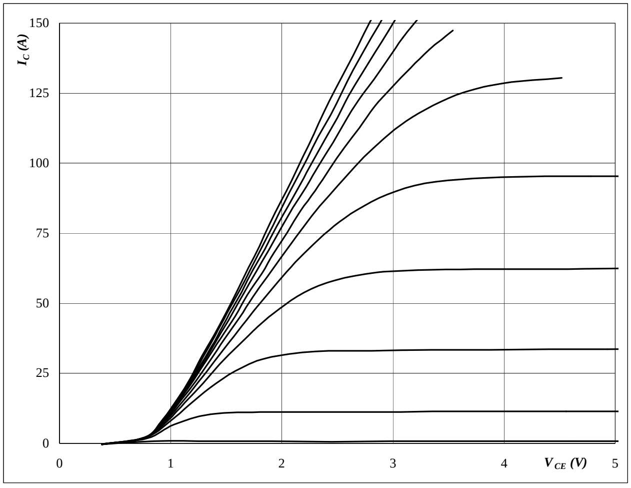
I_C = 15 A

Polarity Switch IGBT

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

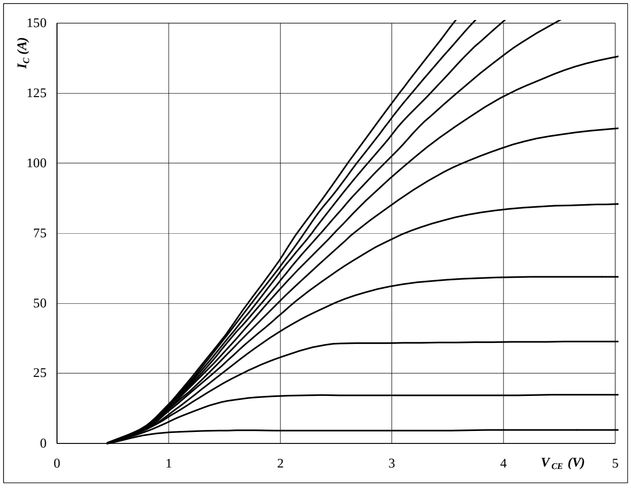
T_j = 25 °C

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

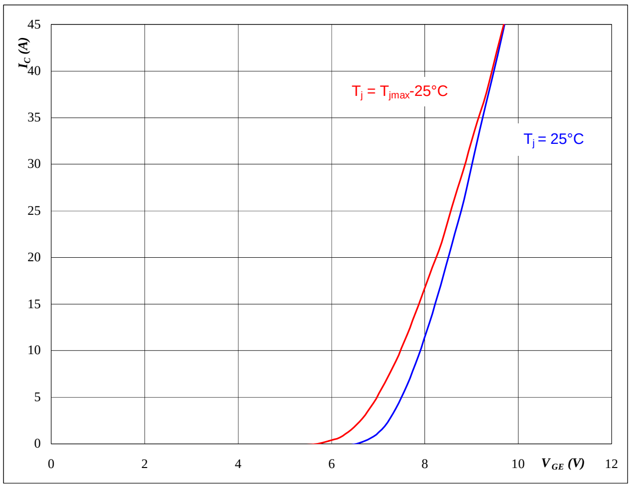
T_j = 125 °C

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

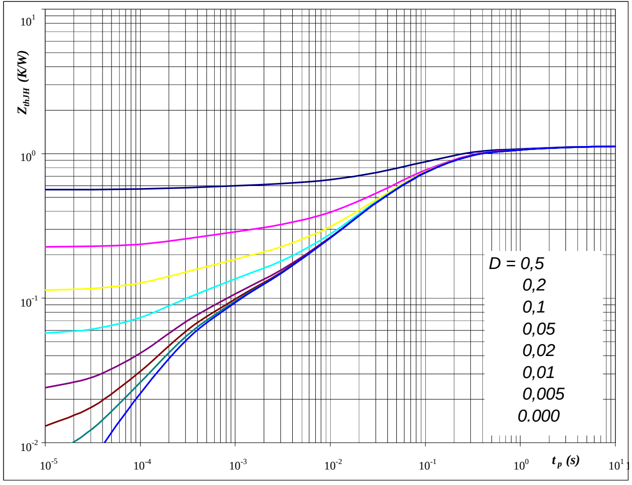
V_{CE} = 10 V

Figure 4 IGBT

IGBT transient thermal impedance

as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D = tp / T

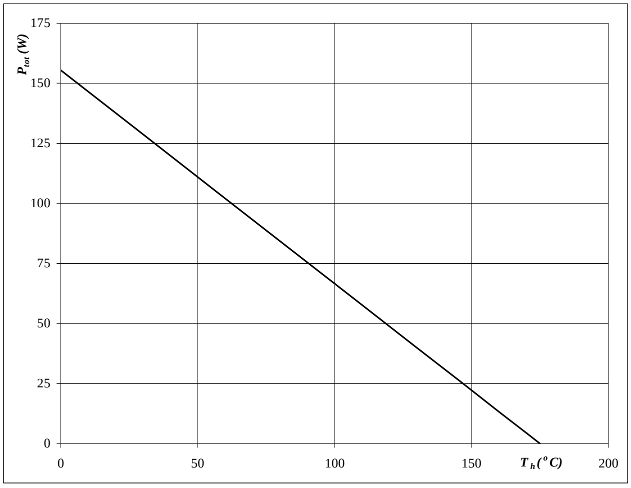
R_{thJH} = 1,13 K/W

Polarity Switch IGBT

Figure 5 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



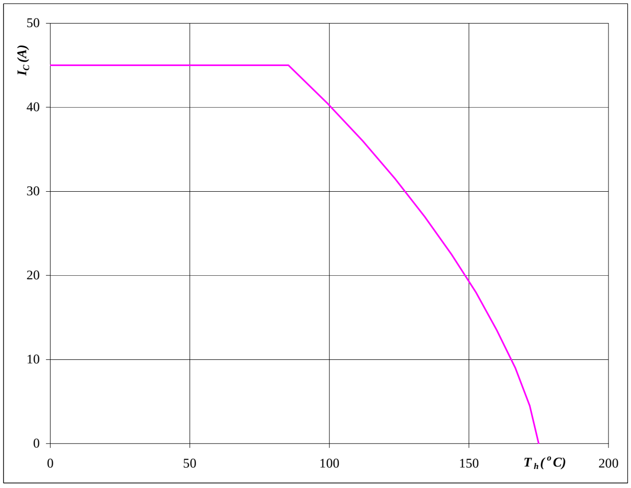
At

T_j = 175 ºC

Figure 6 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

T_j = 175 ºC

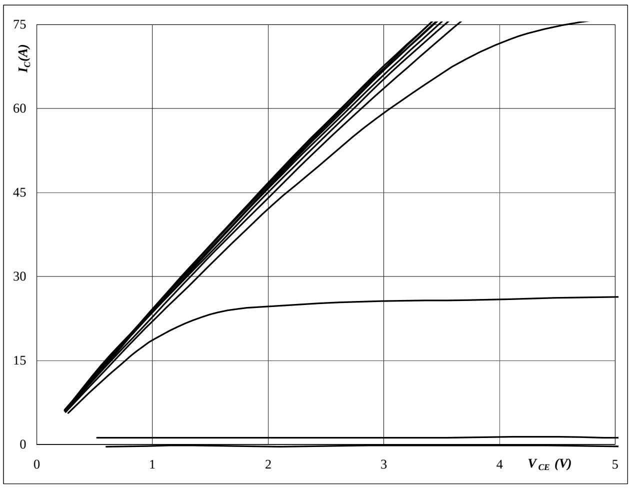
V_{GE} = 15 V

INPUT BOOST

Figure 3 MOSFET

Typical output characteristics

$I_D = f(V_{DS})$



At

t_p = 250 μs

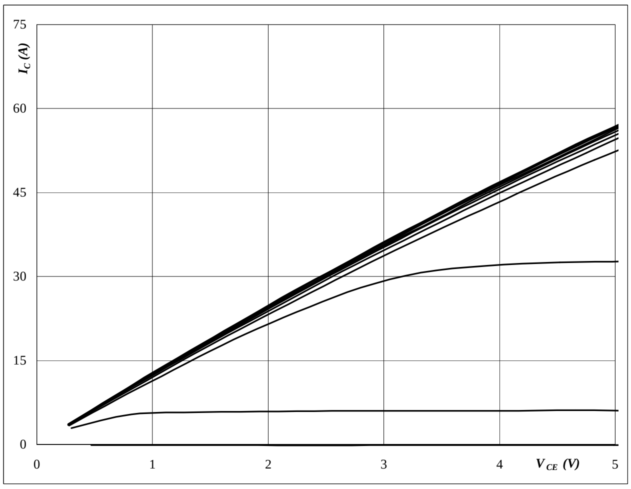
T_j = 25 °C

V_{GS} from 3 V to 13 V in steps of 1 V

Figure 4 BOOST FWD

Typical output characteristics

$I_D = f(V_{DS})$



At

t_p = 250 μs

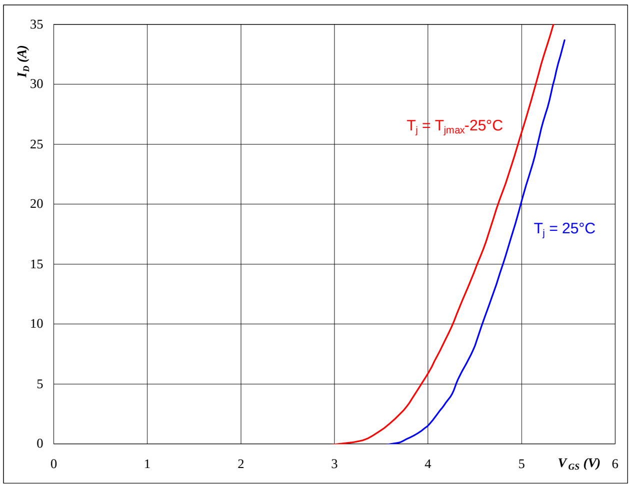
T_j = 125 °C

V_{GS} from 3 V to 13 V in steps of 1 V

Figure 3 MOSFET

Typical transfer characteristics

$I_D = f(V_{DS})$



At

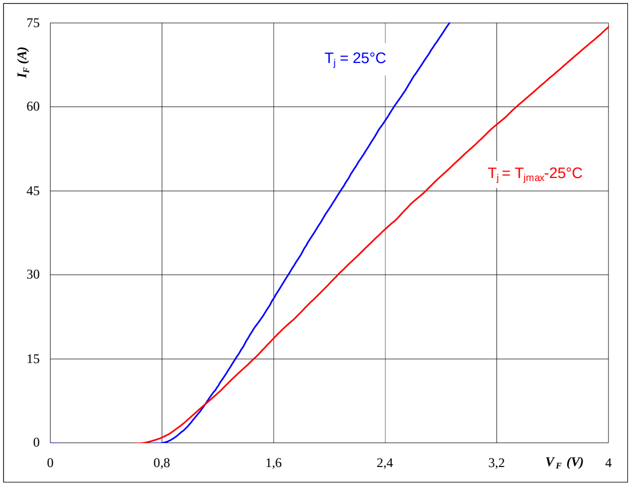
t_p = 250 μs

V_{DS} = 10 V

Figure 4 BOOST FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



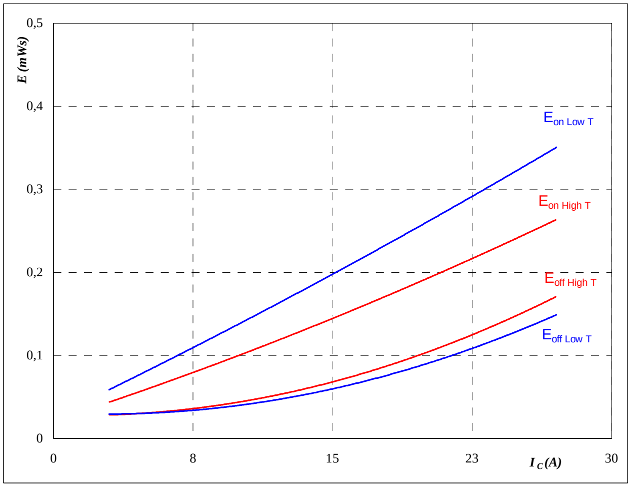
At

t_p = 250 μs

INPUT BOOST

Figure 5 MOSFET

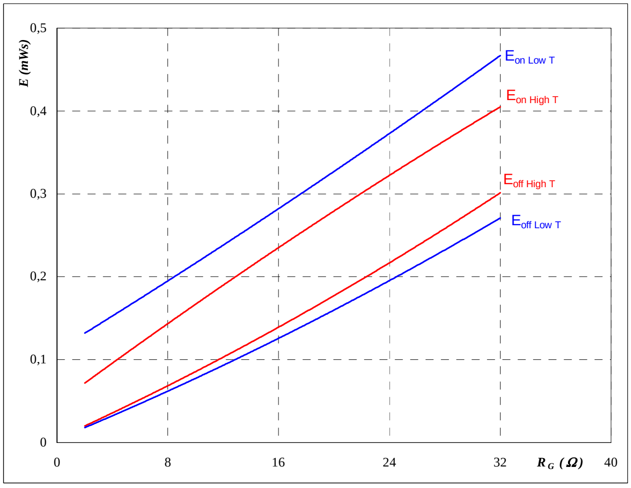
Typical switching energy losses
as a function of collector current
E = f(I_D)



With an inductive load at
T_j = 25/125 °C
V_{DS} = 400 V
V_{GS} = 10 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 6 MOSFET

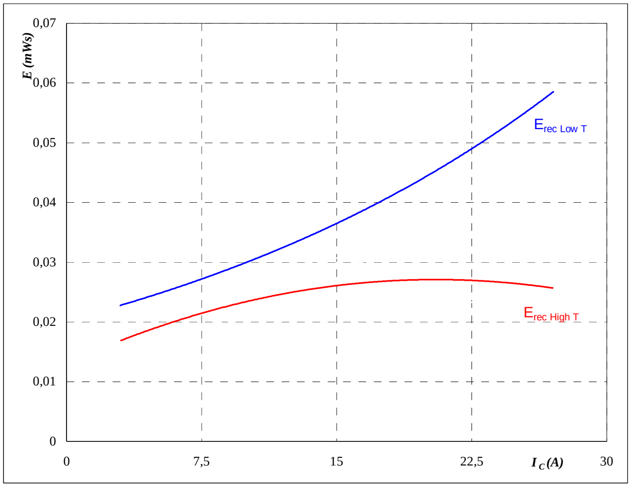
Typical switching energy losses
as a function of gate resistor
E = f(R_G)



With an inductive load at
T_j = 25/125 °C
V_{DS} = 400 V
V_{GS} = 10 V
I_D = 15 A

Figure 7 MOSFET

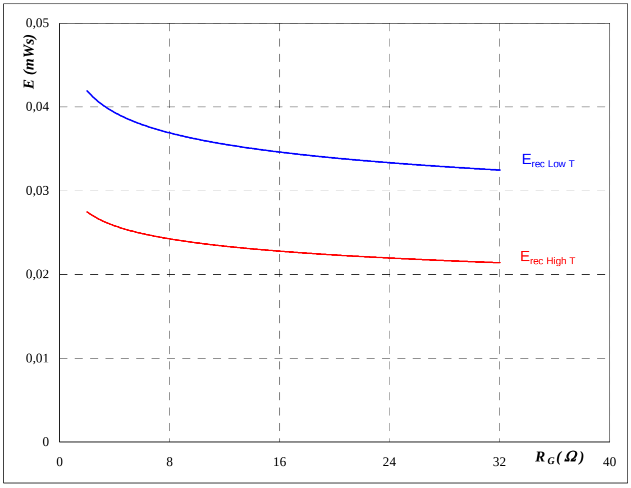
Typical reverse recovery energy loss
as a function of collector (drain) current
E_{rec} = f(I_c)



With an inductive load at
T_j = 25/125 °C
V_{DS} = 400 V
V_{GS} = 10 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 8 MOSFET

Typical reverse recovery energy loss
as a function of gate resistor
E_{rec} = f(R_G)



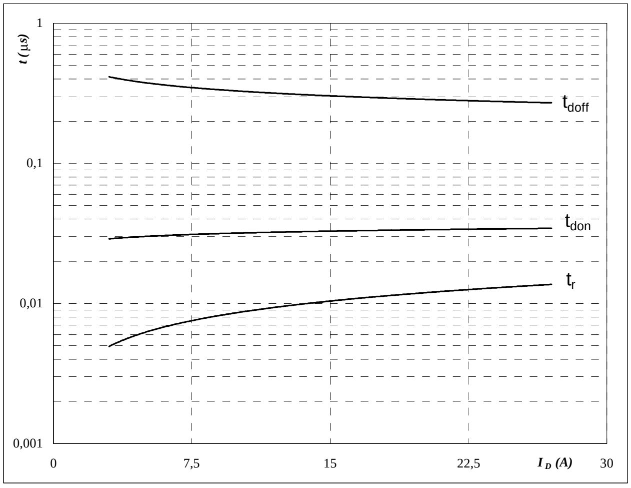
With an inductive load at
T_j = 25/125 °C
V_{DS} = 400 V
V_{GS} = 10 V
I_D = 15 A

INPUT BOOST

Figure 9 MOSFET

Typical switching times as a function of collector current

$t = f(I_D)$



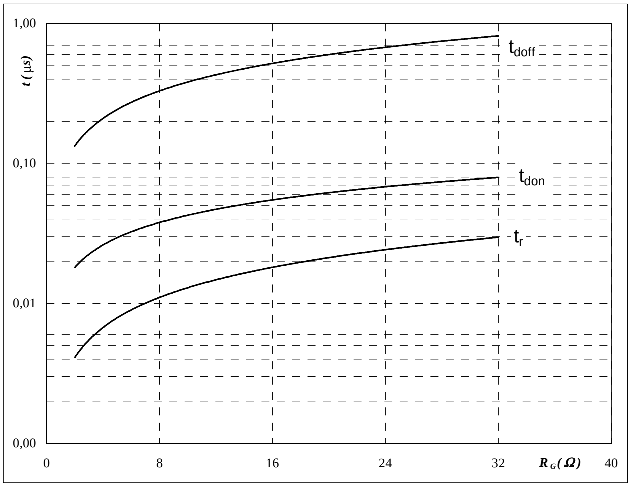
With an inductive load at

T_j = 125 °C
V_{DS} = 400 V
V_{GS} = 10 V
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 10 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



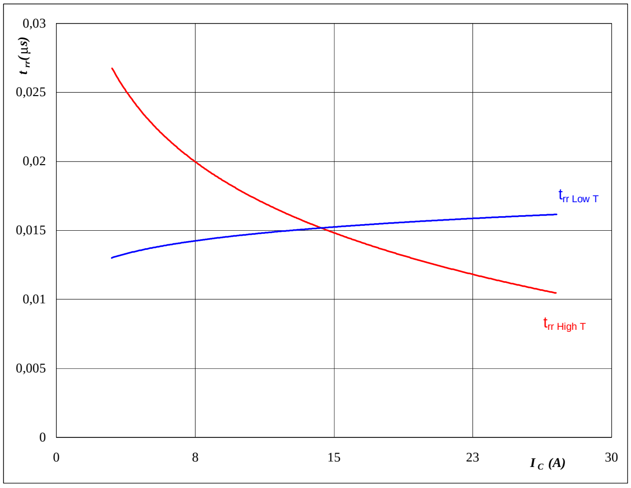
With an inductive load at

T_j = 125 °C
V_{DS} = 400 V
V_{GS} = 10 V
I_C = 15 A

Figure 11 BOOST FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(Ic)$



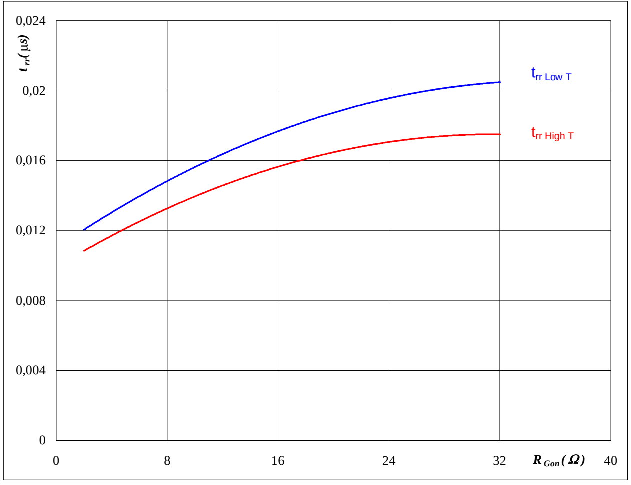
At

T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 12 BOOST FWD

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

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



At

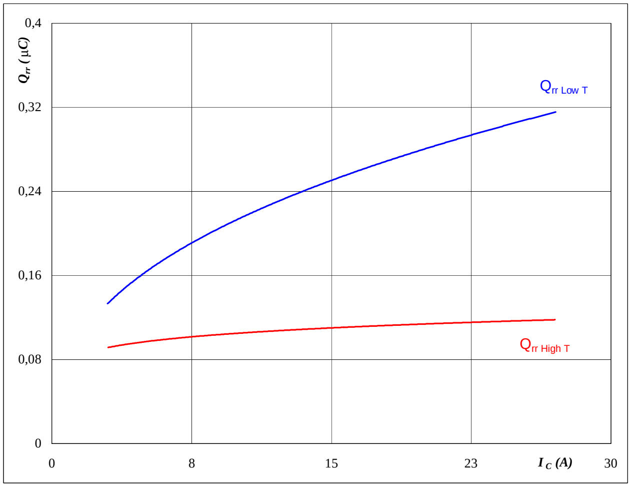
T_j = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GS} = 10 V

INPUT BOOST

Figure 13 BOOST FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

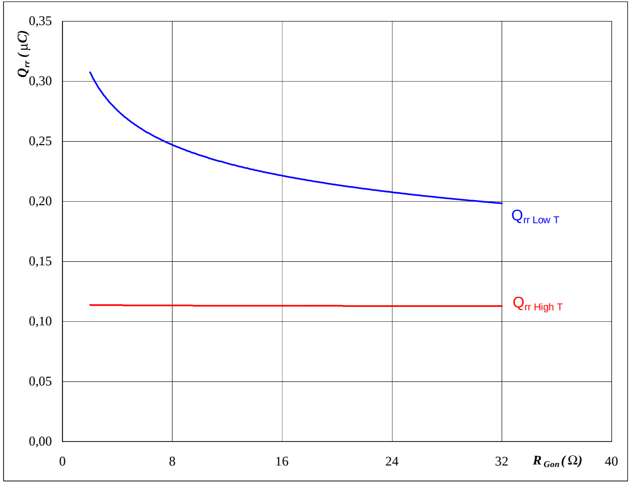


At
T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 14 BOOST FWD

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

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

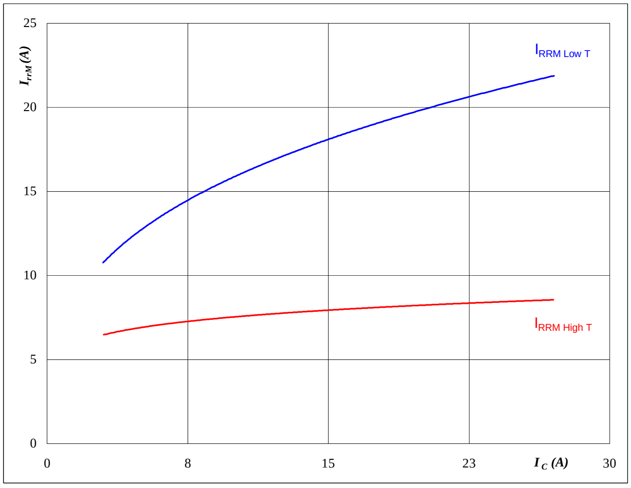


At
Tj = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GS} = 10 V

Figure 15 BOOST FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

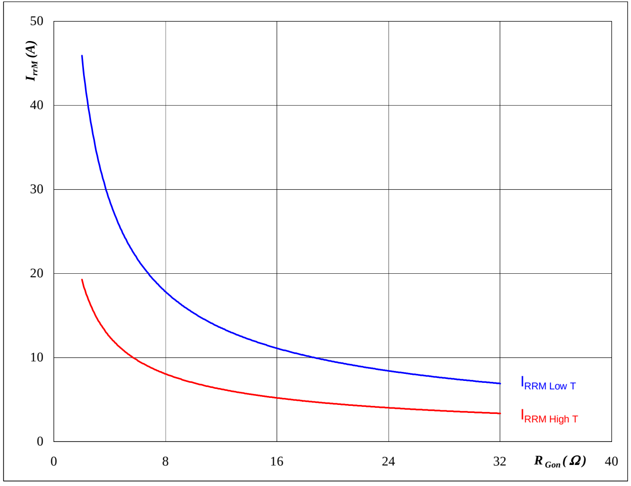


At
T_j = 25/125 °C
V_{CE} = 400 V
V_{GE} = 10 V
R_{gon} = 8 Ω

Figure 16 BOOST FWD

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

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



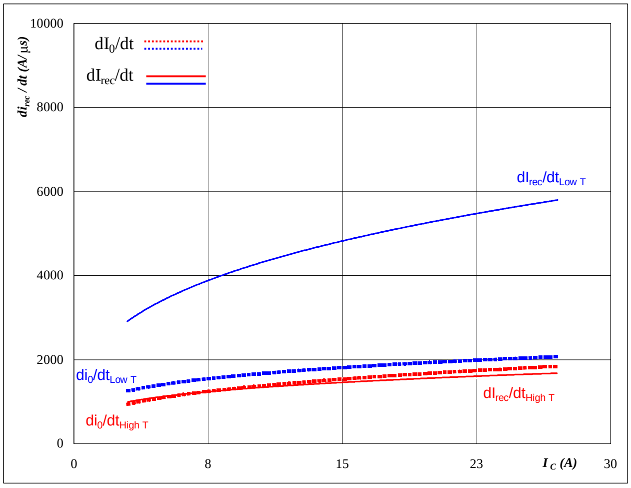
At
T_j = 25/125 °C
V_R = 400 V
I_F = 15 A
V_{GS} = 10 V

INPUT BOOST

Figure 17 BOOST FWD

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

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



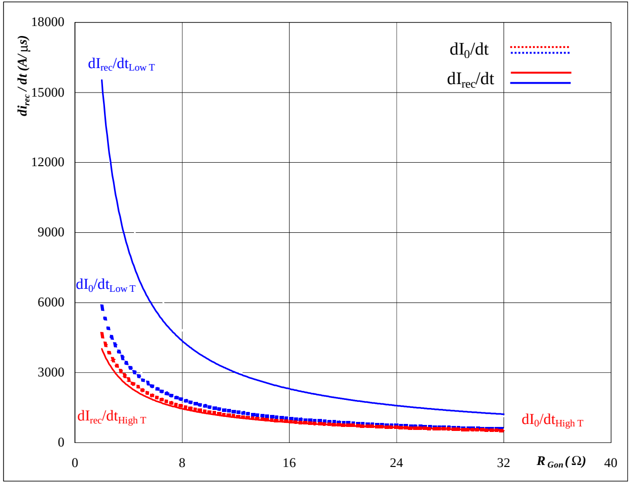
At

T_j =	25/125	°C
V_{CE} =	400	V
V_{GE} =	10	V
R_{gon} =	8	Ω

Figure 18 BOOST FWD

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

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



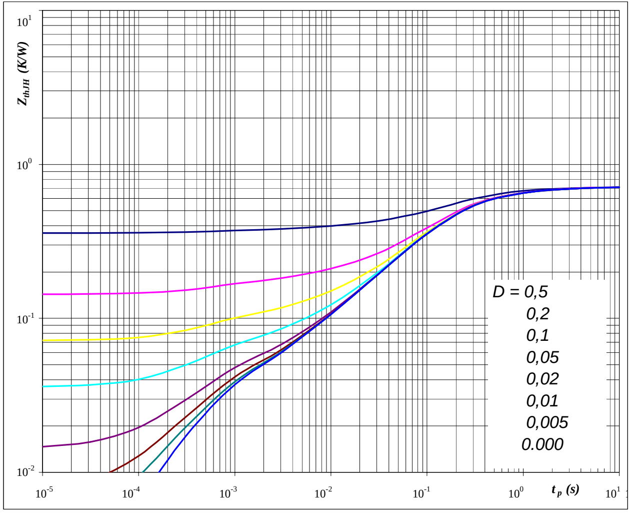
At

Tj =	25/125	°C
VR =	400	V
IF =	15	A
VGS =	10	V

Figure 19 MOSFET

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

$Z_{thJH} = f(t_p)$



At

D =	t_p / T	
R_{thJH} =	0,72	K/W

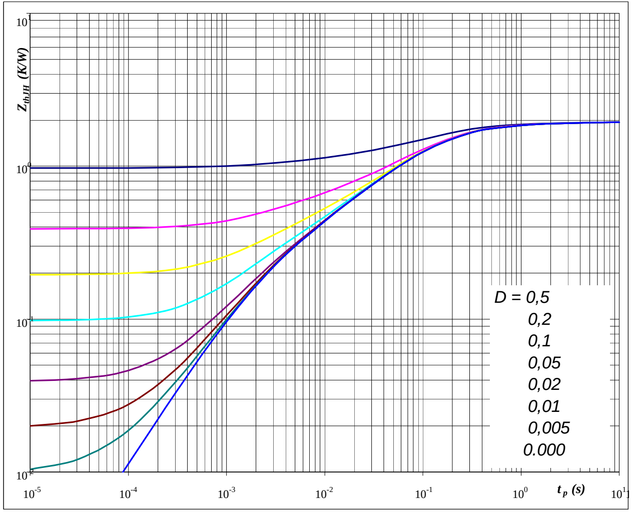
IGBT thermal model values ú

R (C/W)	Tau (s)
0,01714	8,749
0,09725	1,33
0,3704	0,2014
0,1548	0,05998
0,04253	0,008246
0,03357	0,0005654

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} =	1,95	K/W

FWD thermal model values

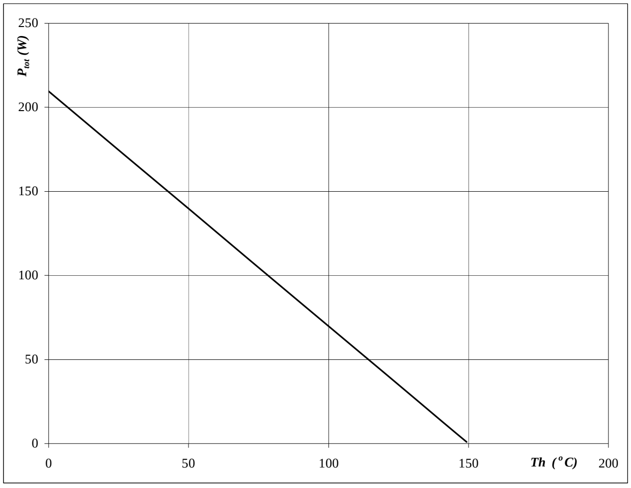
R (C/W)	Tau (s)
0,02765	9,595
0,1151	1,46
0,3598	0,3129
0,8406	0,09758
0,2989	0,02916
0,1886	0,007121

INPUT BOOST

Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



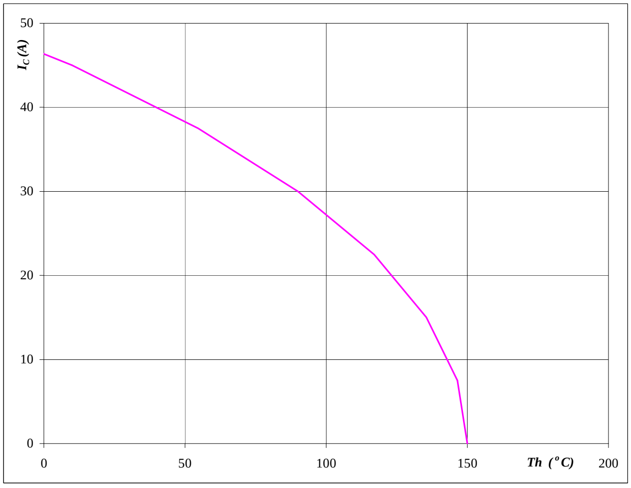
At

T_j = 150 ºC

Figure 22 MOSFET

Collector/Drain current as a function of heatsink temperature

$I_C = f(T_h)$



At

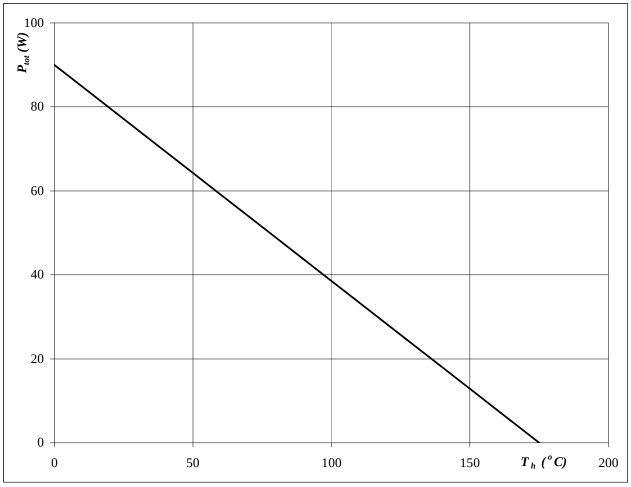
T_j = 150 ºC

V_{GS} = 10 V

Figure 23 BOOST FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



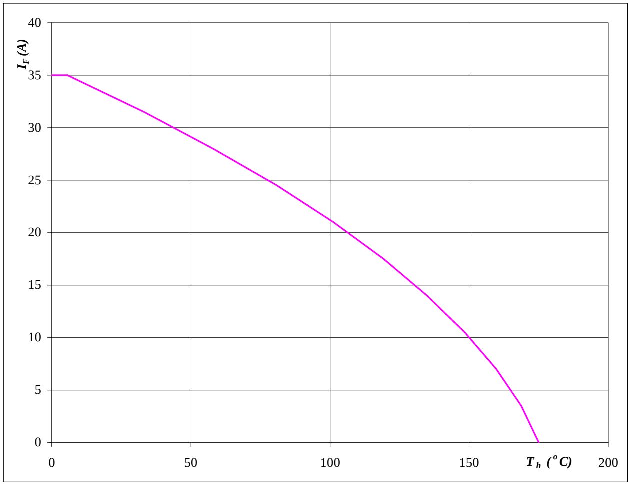
At

T_j = 175 ºC

Figure 24 BOOST FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

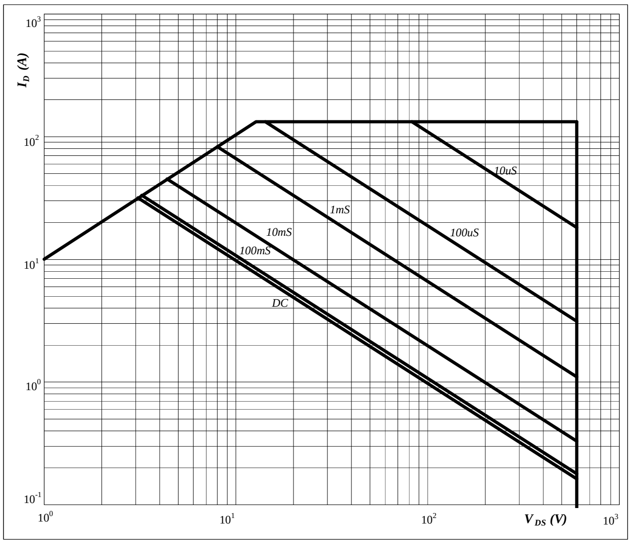
T_j = 175 ºC

INPUT BOOST

Figure 25 MOSFET

Safe operating area as a function of drain-source voltage

$I_D = f(V_{DS})$



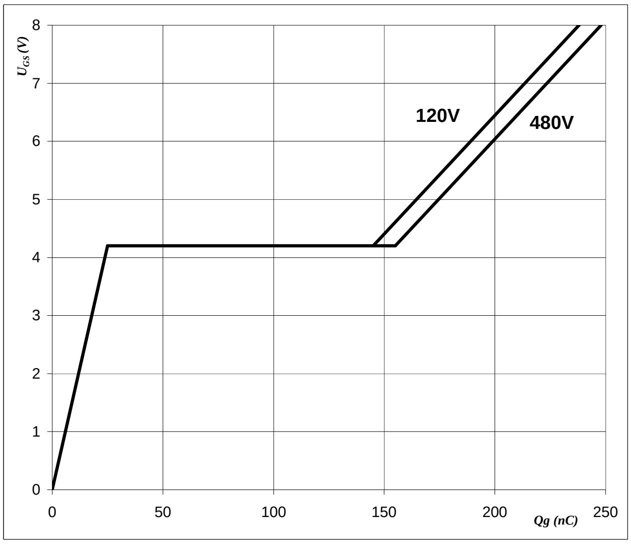
At

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

Figure 26 MOSFET

Gate voltage vs Gate charge

$V_{GS} = f(Qg)$



At

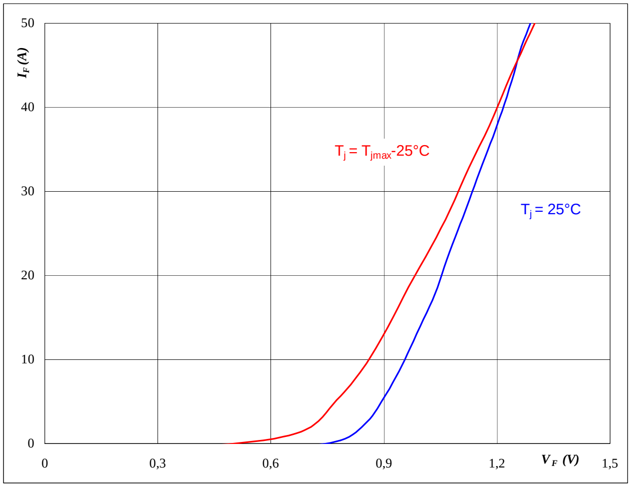
I_D =	15	A

Bypass Diode

Figure 1 Bypass diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



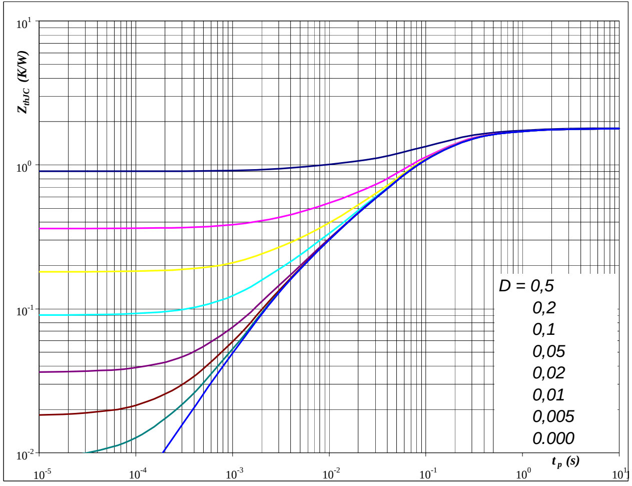
At

t_p = 250 µs

Figure 2 Bypass diode

Diode transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

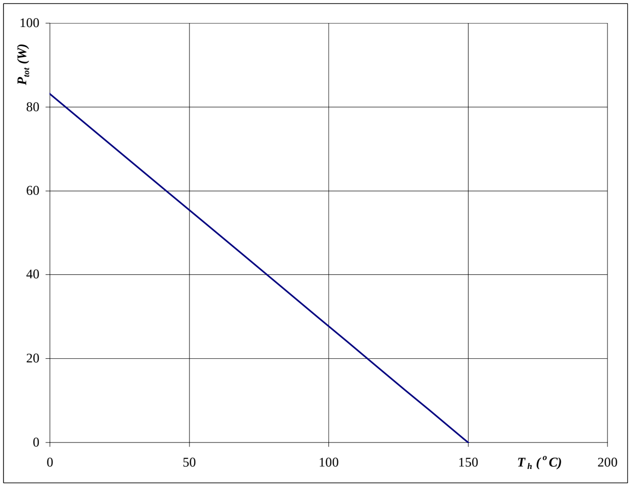
D = t_p / T

R_{thJH} = 1,804 K/W

Figure 3 Bypass diode

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



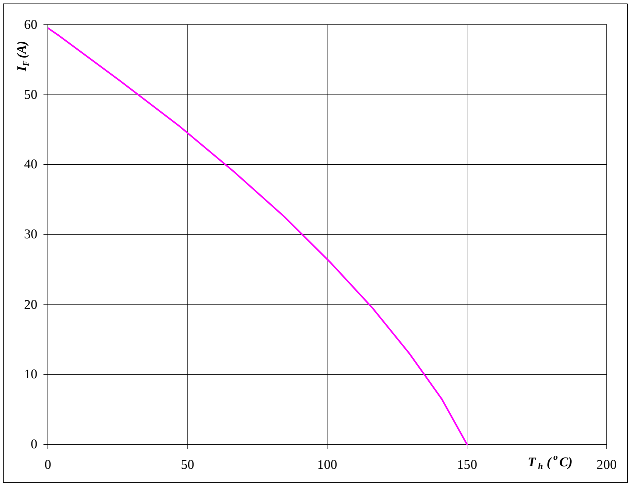
At

T_j = 150 ºC

Figure 4 Bypass diode

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



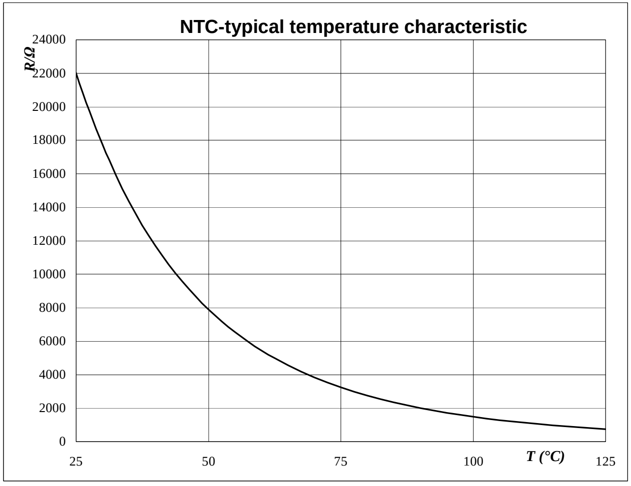
At

T_j = 150 ºC

Thermistor

Figure 1 Thermistor

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



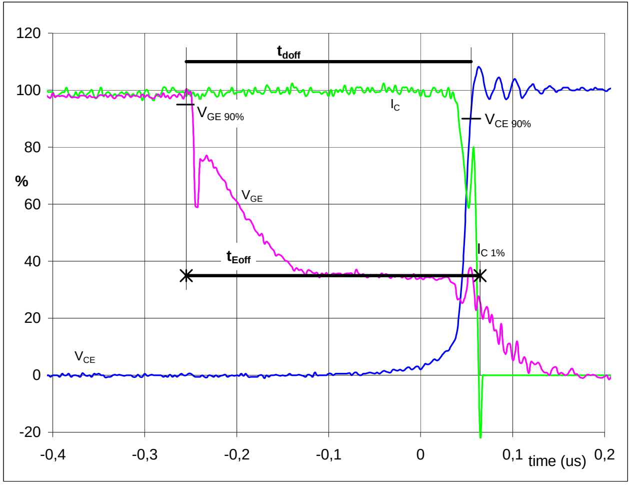
Switching Definitions BUCK MOSFET

General conditions

T_j = 125 °C
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 1 BUCK MOSFET

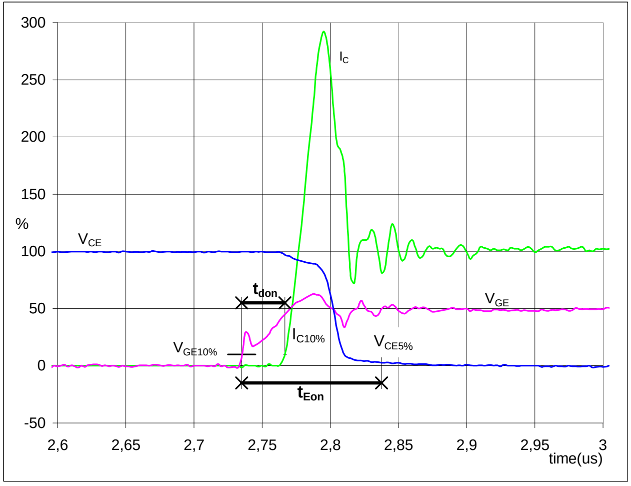
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) = 0 V
V_{GE} (100%) = 10 V
V_C (100%) = 400 V
I_C (100%) = 15 A
t_{doff} = 0,30 µs
t_{Eoff} = 0,32 µs

Figure 2 BUCK MOSFET

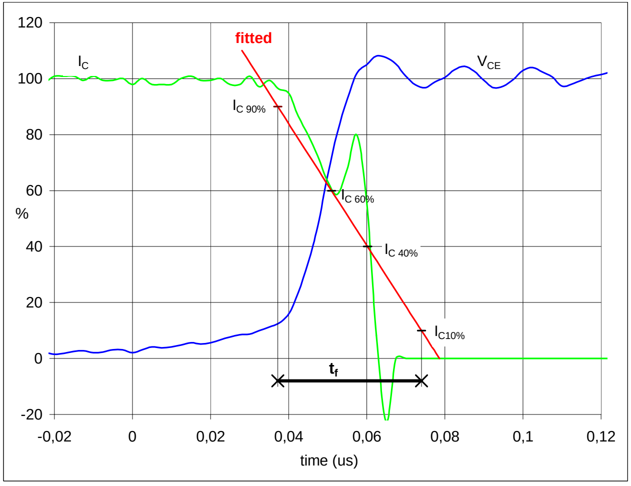
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) = 0 V
V_{GE} (100%) = 10 V
V_C (100%) = 400 V
I_C (100%) = 15 A
t_{don} = 0,03 µs
t_{Eon} = 0,10 µs

Figure 3 BUCK MOSFET

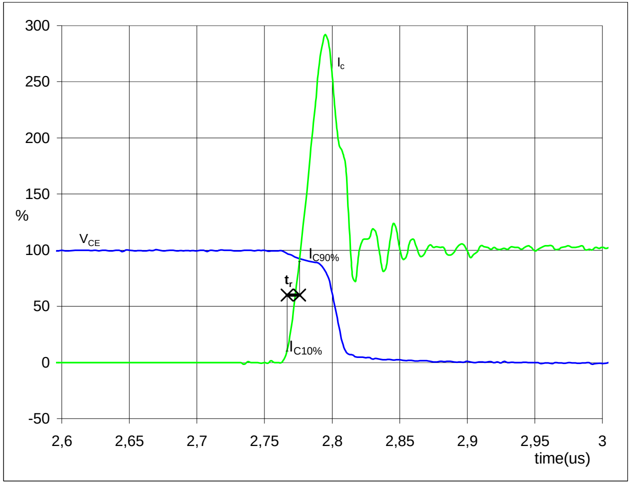
Turn-off Switching Waveforms & definition of t_f



V_C (100%) = 400 V
I_C (100%) = 15 A
t_f = 0,004 µs

Figure 4 BUCK MOSFET

Turn-on Switching Waveforms & definition of t_r

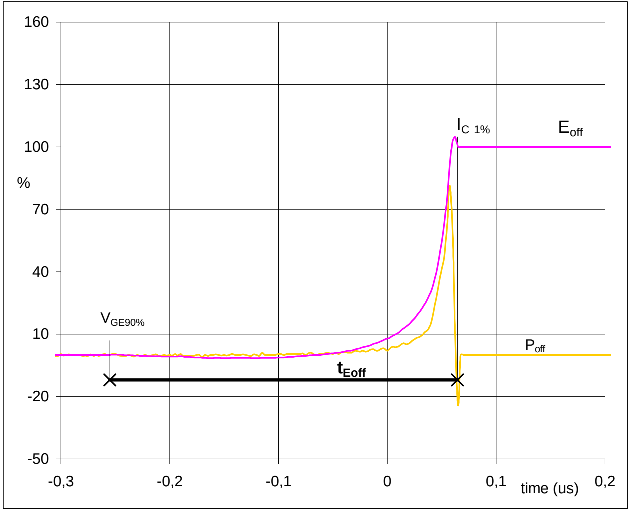


V_C (100%) = 400 V
I_C (100%) = 15 A
t_r = 0,01 µs

Switching Definitions BUCK MOSFET

Figure 5 BUCK MOSFET

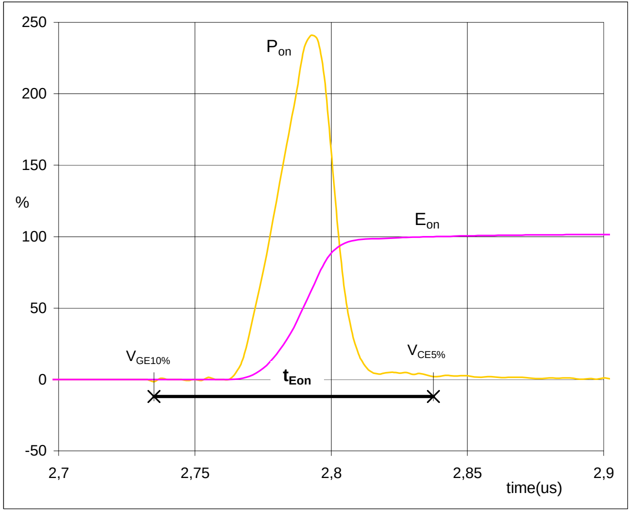
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	6,00	kW
E_{off} (100%) =	0,08	mJ
t_{Eoff} =	0,32	μs

Figure 6 BUCK MOSFET

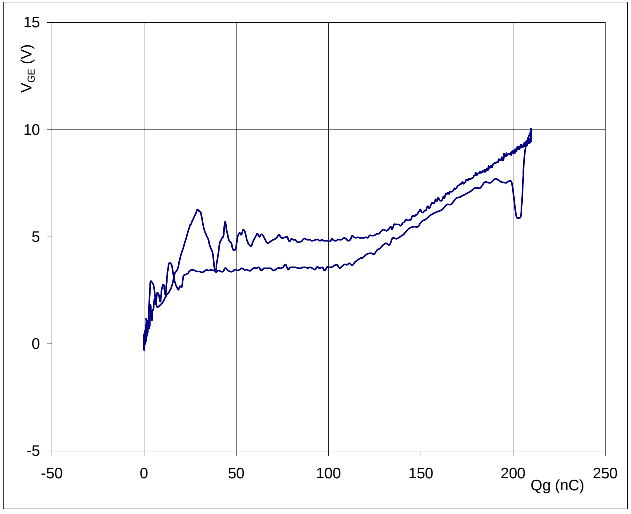
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	6,00	kW
E_{on} (100%) =	0,35	mJ
t_{Eon} =	0,10	μs

Figure 7 BUCK FWD

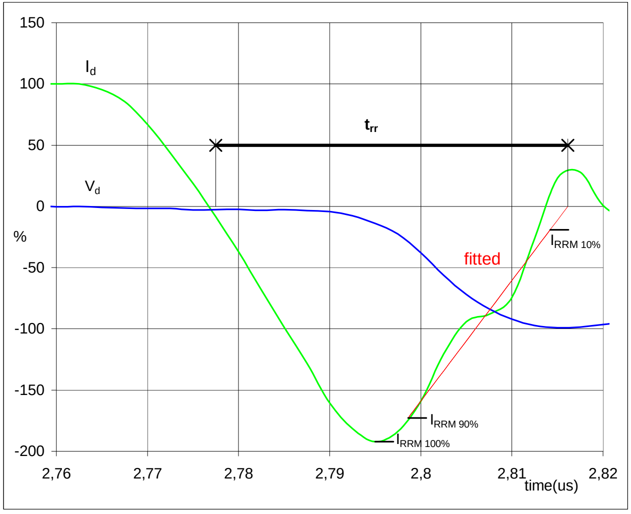
Gate voltage vs Gate charge (measured)



V_{GEoff} =	0	V
V_{GEon} =	10	V
V_C (100%) =	400	V
I_C (100%) =	15	A
Q_g =	209,77	nC

Figure 8 BUCK MOSFET

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

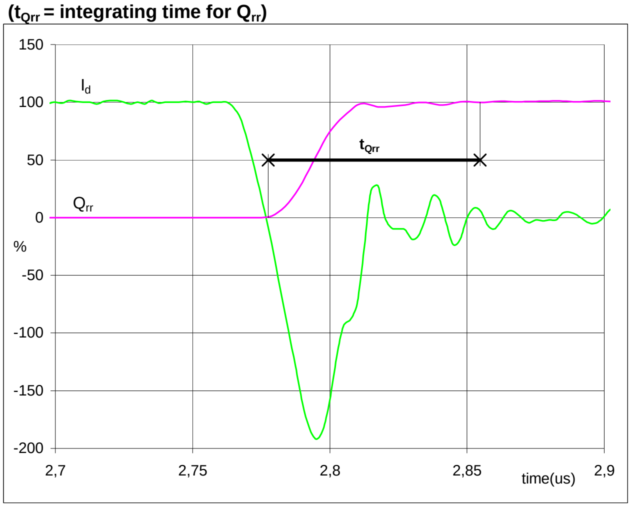


V_d (100%) =	400	V
I_d (100%) =	15	A
I_{RRM} (100%) =	-29	A
t_{rr} =	0,04	μs

Switching Definitions BUCK MOSFET

Figure 9 BUCK FWD

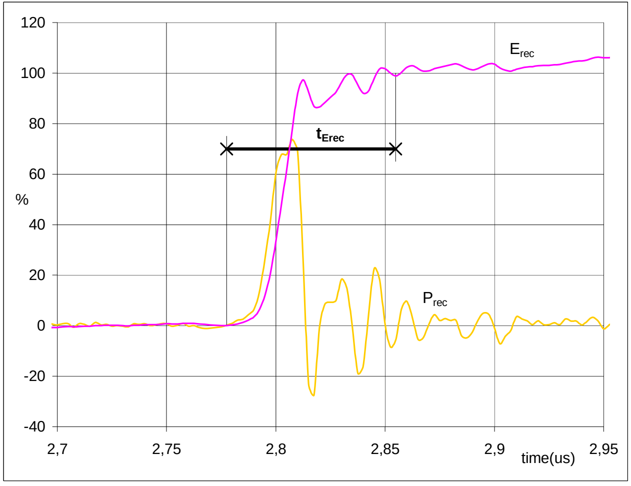
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	15	A
Q_{rr} (100%) =	0,62	µC
t_{Qrr} =	0,08	µs

Figure 10 BUCK FWD

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



P_{rec} (100%) =	6,00	kW
E_{rec} (100%) =	0,08	mJ
t_{Erec} =	0,08	µs

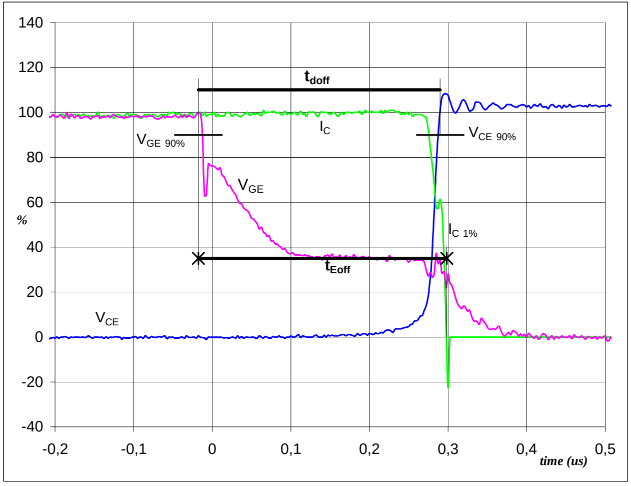
Switching Definitions INP. BOOST

General conditions

T_j = 125 °C
R_{gon} = 8 Ω
R_{goff} = 8 Ω

Figure 1 MOSFET

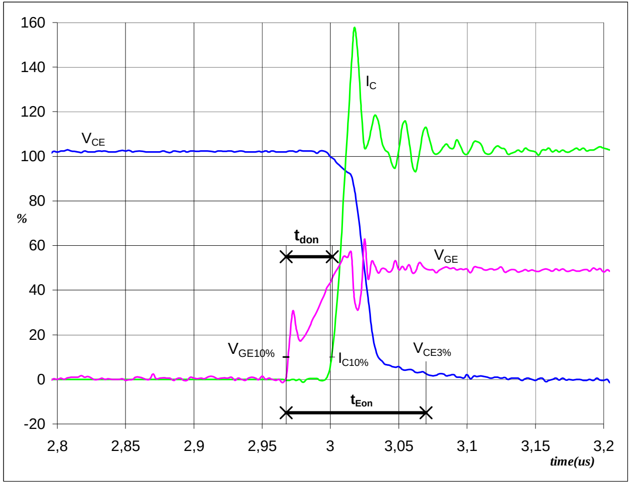
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
(t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) = 0 V
V_{GE} (100%) = 10 V
V_C (100%) = 400 V
I_C (100%) = 15 A
t_{doff} = 0,30 μs
t_{Eoff} = 0,32 μs

Figure 2 MOSFET

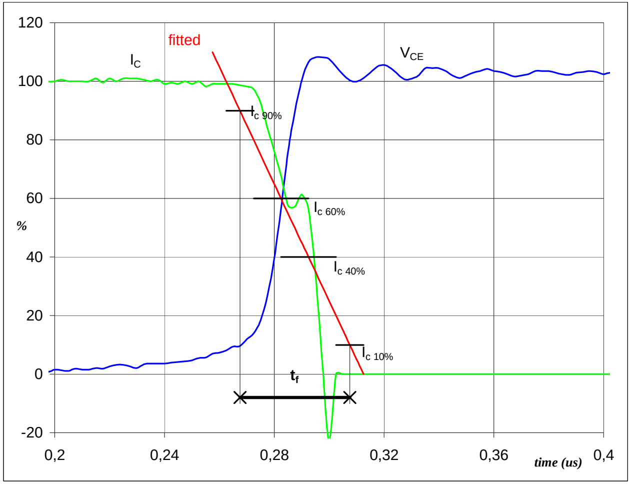
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) = 0 V
V_{GE} (100%) = 10 V
V_C (100%) = 400 V
I_C (100%) = 15 A
t_{don} = 0,04 μs
t_{Eon} = 0,10 μs

Figure 3 MOSFET

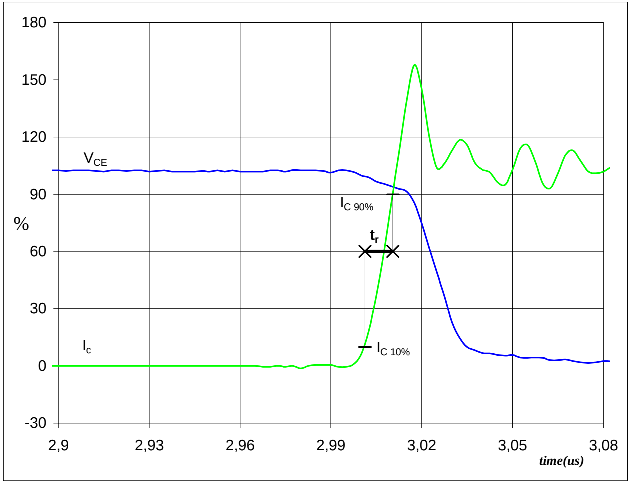
Turn-off Switching Waveforms & definition of t_f



V_C (100%) = 400 V
I_C (100%) = 15 A
t_f = 0,03 μs

Figure 4 MOSFET

Turn-on Switching Waveforms & definition of t_r

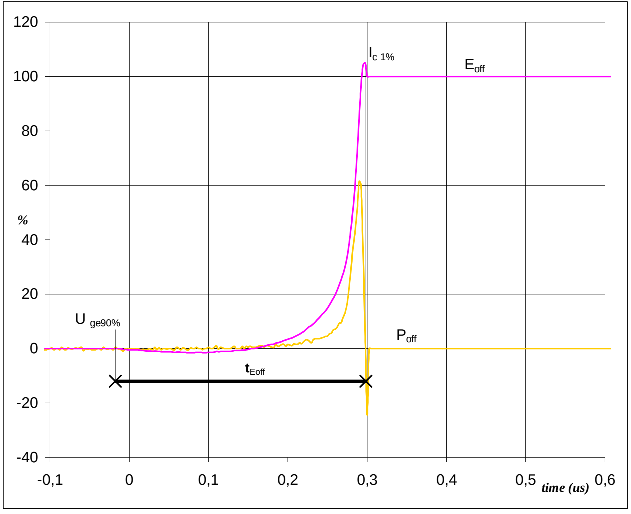


V_C (100%) = 400 V
I_C (100%) = 15 A
t_r = 0,01 μs

Switching Definitions INP. BOOST

Figure 5 MOSFET

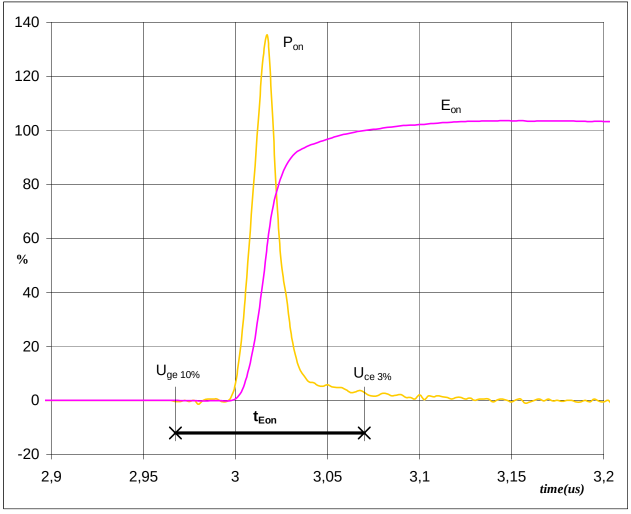
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	6,00	kW
E_{off} (100%) =	0,07	mJ
t_{Eoff} =	0,32	µs

Figure 6 MOSFET

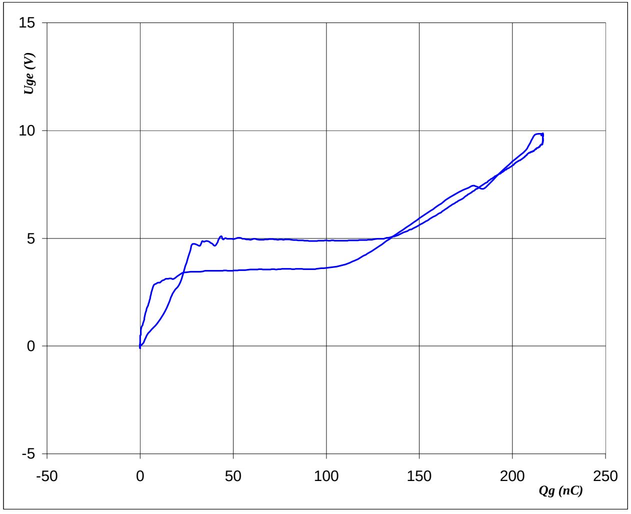
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	6,0036	kW
E_{on} (100%) =	0,15	mJ
t_{Eon} =	0,1025	µs

Figure 7 MOSFET

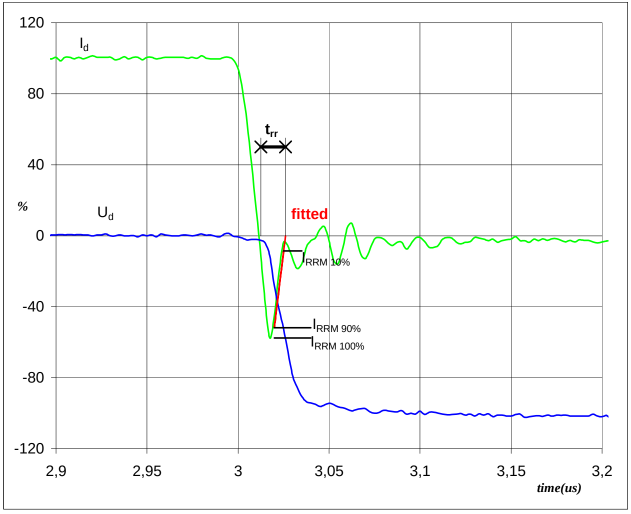
Gate voltage vs Gate charge (measured)



V_{GEoff} =	0	V
V_{GEon} =	10	V
V_C (100%) =	400	V
I_C (100%) =	15	A
Q_g =	216,35	nC

Figure 8 FWD

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

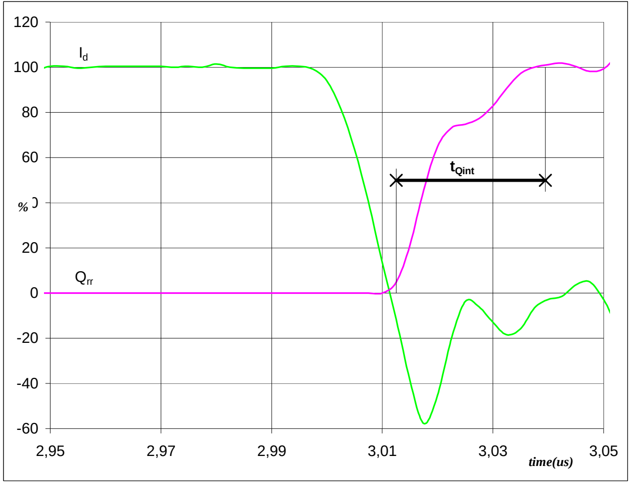


V_d (100%) =	400	V
I_d (100%) =	15	A
I_{RRM} (100%) =	-6	A
t_{rr} =	0,03	µs

Switching Definitions INP. BOOST

Figure 9 FWD

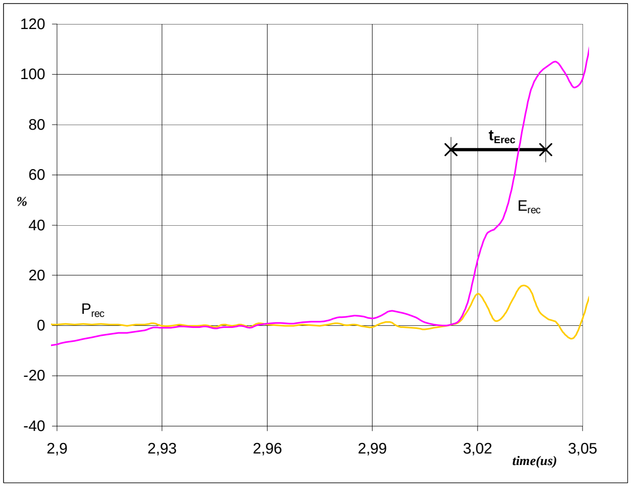
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr}= integrating time for Q_{rr})



I_d (100%) = 15 A
Q_{rr} (100%) = 0,19 µC
t_{Qint} = 0,03 µs

Figure 10 FWD

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



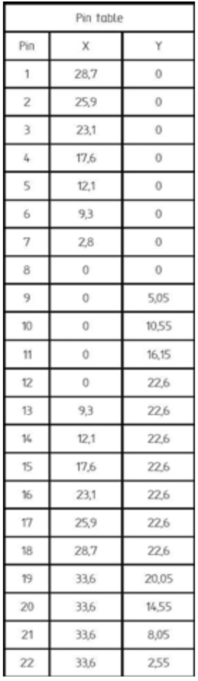
P_{rec} (100%) = 6,00 kW
E_{rec} (100%) = 0,06 mJ
t_{Erec} = 0,03 µs

Ordering Code and Marking - Outline - Pinout

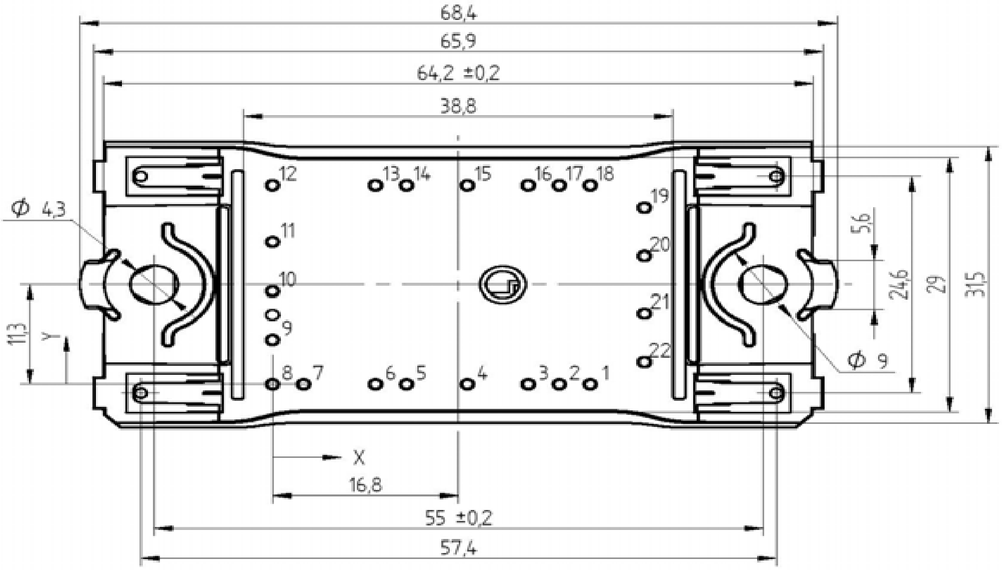
Ordering Code & Marking

Version	**Ordering Code**	**in DataMatrix as**	**in packaging barcode as**
without thermal paste 12mm housing	10-FZ06BIA041FS01-P898E10	P898E10	P898E10

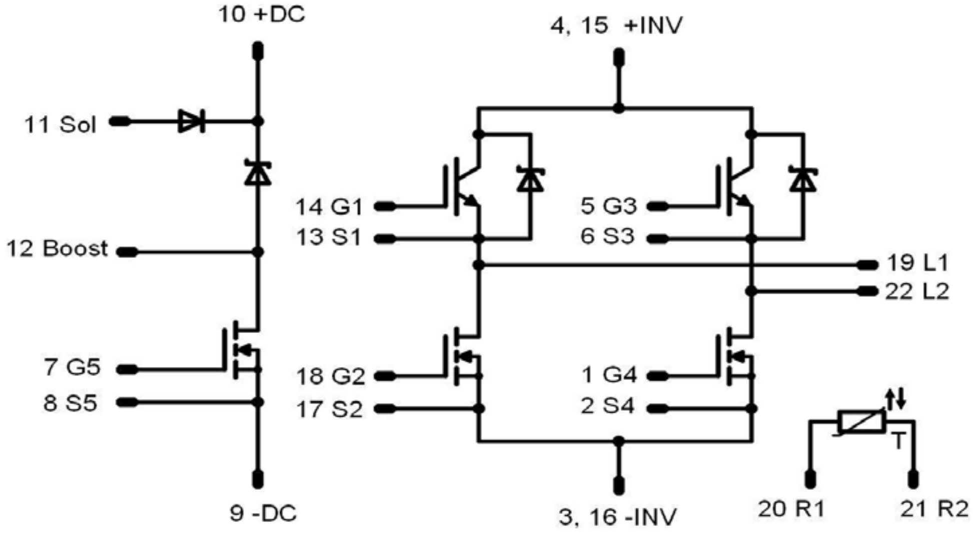
Outline



Pin table		
Pin	X	Y
1	28,7	0
2	25,9	0
3	23,1	0
4	17,6	0
5	12,1	0
6	9,3	0
7	2,8	0
8	0	0
9	0	5,05
10	0	10,55
11	0	16,15
12	0	22,6
13	9,3	22,6
14	12,1	22,6
15	17,6	22,6
16	23,1	22,6
17	25,9	22,6
18	28,7	22,6
19	33,6	20,05
20	33,6	14,55
21	33,6	8,05
22	33,6	2,55



Pinout



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.
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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.

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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.