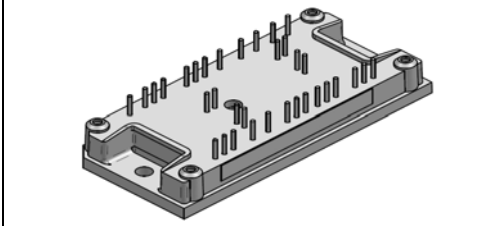
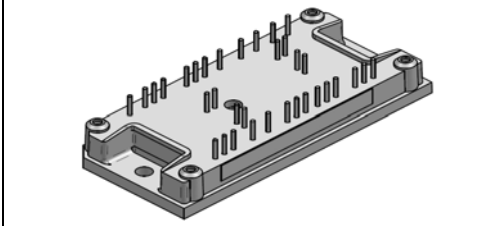
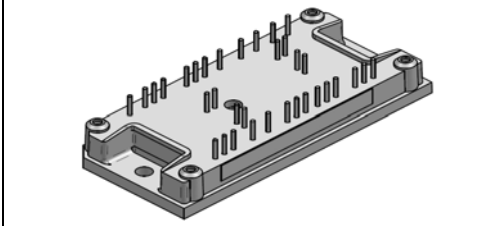
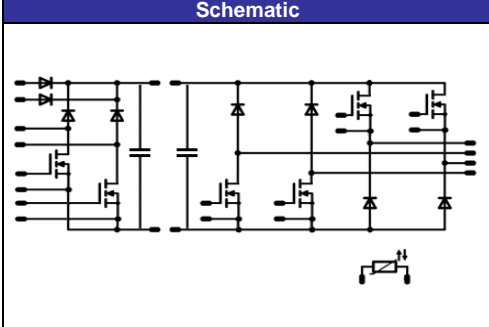
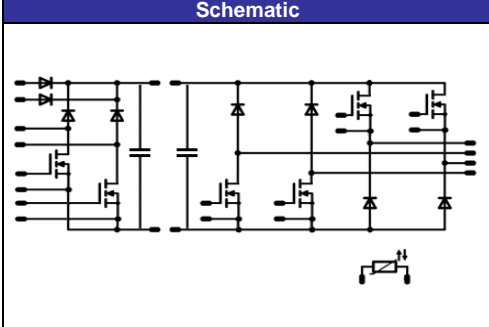
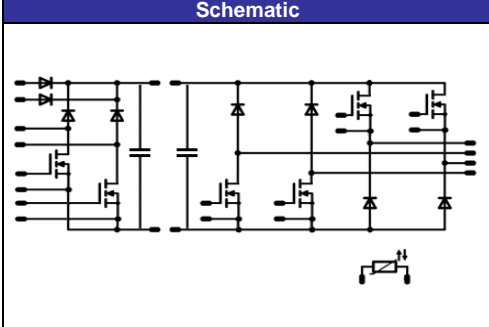


flowSOL 1 BI	650V / 41mOhm				
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Types					
10-FY07BIA041MF-M528E68					

Bypass Diode

Repetitive peak reverse voltage	V_{RRM}			1600	V
Forward current per diode	I_{FAV}	DC current	$T_h=80^{\circ}C$ $T_c=80^{\circ}C$	41 55	A
Surge forward current	I_{FSM}	$t_p=10ms$	$T_j=25^{\circ}C$	370	A
I2t-value	I^2t			370	A ² s
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}C$ $T_c=80^{\circ}C$	50 76	W
Maximum Junction Temperature	T_{jmax}			150	°C

Input Boost MOSFET

Drain to source breakdown voltage	V_{DS}			650	V
DC drain current	I_D	$T_j=T_{jmax}$	$T_h=80^{\circ}C$ $T_c=80^{\circ}C$	35 42	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_{jmax}		297	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}C$ $T_c=80^{\circ}C$	105 159	W
Gate-source peak voltage	V_{GS}			±20	V
Maximum Junction Temperature	T_{jmax}			150	°C

Input Boost Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	650	V
DC forward current	I_F	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 27 $T_c=80^{\circ}\text{C}$ 35	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	180	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 49 $T_c=80^{\circ}\text{C}$ 74	W
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

Pseudo H-Bridge MOSFET

Drain to source breakdown voltage	V_{DS}		650	V
DC drain current	I_D	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 35 $T_c=80^{\circ}\text{C}$ 42	A
Pulsed drain current	I_{Dpulse}	t_p limited by T_{jmax}	$T_c=25^{\circ}\text{C}$ 255	A
Power dissipation	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 111 $T_c=80^{\circ}\text{C}$ 168	W
Gate-source peak voltage	V_{gs}		± 20	V
Maximum Junction Temperature	T_{jmax}		150	$^{\circ}\text{C}$

Pseudo H-Bridge Diode

Peak Repetitive Reverse Voltage	V_{RRM}	$T_j=25^{\circ}\text{C}$	650	V
DC forward current	I_F	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 27 $T_c=80^{\circ}\text{C}$ 36	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	180	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$	$T_h=80^{\circ}\text{C}$ 49 $T_c=80^{\circ}\text{C}$ 74	W
Maximum Junction Temperature	T_{jmax}		175	$^{\circ}\text{C}$

DC link Capacitor

Max.DC voltage	V_{MAX}	$T_c=25^{\circ}\text{C}$	630	V
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Thermal Properties

Storage temperature	T_{stg}		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	T_{op}		-40...+($T_{jmax} - 25$)	$^{\circ}\text{C}$

Insulation Properties

Insulation voltage	V_{is}	$t=2\text{s}$ 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

Forward voltage	V_F				35	$T_j=25^\circ C$ $T_j=125^\circ C$		1.18 1.17	1.21	V	
Threshold voltage (for power loss calc. only)	V_{th}				35	$T_j=25^\circ C$ $T_j=125^\circ C$		0.91 0.80		V	
Slope resistance (for power loss calc. only)	r_t				35	$T_j=25^\circ C$ $T_j=125^\circ C$		0.008 0.010		Ω	
Reverse current	I_r			1600		$T_j=25^\circ C$ $T_j=125^\circ C$			0.05	mA	
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$							1.40		K/W

Input Boost MOSFET

Static drain to source ON resistance	$R_{DS(on)}$		10		33	$T_j=25^\circ C$ $T_j=125^\circ C$		38 78		m Ω	
Gate threshold voltage	$V_{(GS)th}$				0.0033	$T_j=25^\circ C$ $T_j=125^\circ C$	2.5	3	3.5	V	
Gate to Source Leakage Current	I_{gss}		20	0		$T_j=25^\circ C$ $T_j=125^\circ C$			100	nA	
Zero Gate Voltage Drain Current	I_{dss}		0	650		$T_j=25^\circ C$ $T_j=125^\circ C$			2000	nA	
Turn On Delay Time	$t_{d(ON)}$	Rgoff=2 Ω Rgon=2 Ω	10	400	30	$T_j=25^\circ C$ $T_j=125^\circ C$		30 29		ns	
Rise Time	t_r					$T_j=25^\circ C$ $T_j=125^\circ C$		6 7			
Turn off delay time	$t_{d(OFF)}$					$T_j=25^\circ C$ $T_j=125^\circ C$		173 182			
Fall time	t_f					$T_j=25^\circ C$ $T_j=125^\circ C$		5 6			
Turn-on energy loss per pulse	E_{on}					$T_j=25^\circ C$ $T_j=125^\circ C$		0.19 0.29			mWs
Turn-off energy loss per pulse	E_{off}					$T_j=25^\circ C$ $T_j=125^\circ C$		0.06 0.09			
Total gate charge	Q_g					Rgon=2 Ω	10	480	49.6		$T_j=25^\circ C$
Gate to source charge	Q_{gs}	$T_j=25^\circ C$		40							
Gate to drain charge	Q_{gd}	$T_j=25^\circ C$		170							
Input capacitance	C_{iss}	f=1MHz	0	100		$T_j=25^\circ C$		7240		pF	
Output capacitance	C_{oss}							380			
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$							0.67		K/W

Input Boost Diode

Forward voltage	V_F				30	$T_j=25^\circ C$ $T_j=125^\circ C$		2.45 2.03	2.6	V						
Reverse leakage current	I_{rm}		10	400	30	$T_j=25^\circ C$ $T_j=125^\circ C$			10	μA						
Peak recovery current	I_{RRM}	Rgon=2 Ω	10	400	30	$T_j=25^\circ C$ $T_j=125^\circ C$		60 70		A						
Reverse recovery time	t_{rr}					$T_j=25^\circ C$ $T_j=125^\circ C$		15 41								
Reverse recovery charge	Q_{rr}					$T_j=25^\circ C$ $T_j=125^\circ C$		0.71 1.35			μC					
Reverse recovered energy	E_{rec}					$T_j=25^\circ C$ $T_j=125^\circ C$		0.18 0.38								
Peak rate of fall of recovery current	$di(rec)max/dt$					$T_j=25^\circ C$ $T_j=125^\circ C$		13199 9226			A/ μs					
Thermal resistance chip to heatsink per chip	R_{thJH}					Thermal grease thickness $\leq 50\mu m$ $\lambda = 1 W/mK$								1.94		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		

Pseudo H-Bridge MOSFET

Static drain to source ON resistance	$R_{ds(on)}$		10		33	$T_j=25^\circ C$ $T_j=125^\circ C$		45 84		m Ω
Gate threshold voltage	$V_{(GS)th}$			$V_{DS}=V_{GS}$	0.0033	$T_j=25^\circ C$ $T_j=125^\circ C$	3.5	4	4.5	V
Gate to Source Leakage Current	I_{gss}		20	0		$T_j=25^\circ C$ $T_j=125^\circ C$			100	nA
Zero Gate Voltage Drain Current	I_{dss}		0	650		$T_j=25^\circ C$ $T_j=125^\circ C$			3500	nA
Turn On Delay Time	$t_{d(ON)}$	R _{goff} =2 Ω R _{gon} =2 Ω	10	400	30	$T_j=25^\circ C$		37		ns
Rise Time	t_r					$T_j=125^\circ C$		35		
Turn off delay time	$t_{d(OFF)}$					$T_j=25^\circ C$		6.6		
Fall time	t_f					$T_j=125^\circ C$		7.8		
Turn-on energy loss per pulse	E_{on}					$T_j=25^\circ C$		145		
Turn-off energy loss per pulse	E_{off}					$T_j=125^\circ C$		153		
Total gate charge	Q_g					$T_j=25^\circ C$		3.6		
Gate to source charge	Q_{gs}			3.2	mWs					
Gate to drain charge	Q_{gd}			0.19						
Input capacitance	C_{iss}	f=1MHz	0	100			$T_j=25^\circ C$		8400	pF
Output capacitance	C_{oss}							400		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50um $\lambda = 1$ W/mK						0.63		K/W

Pseudo H-Bridge Diode

Diode forward voltage	V_F				30	$T_j=25^\circ C$ $T_j=125^\circ C$		2.46 2.02	2.6	V
Peak reverse recovery current	I_{RRM}	R _{gon} =2 Ω				$T_j=25^\circ C$		56		A
Reverse recovery time	t_{rr}					$T_j=125^\circ C$		61		
Reverse recovered charge	Q_{rr}					$T_j=25^\circ C$		15		
Peak rate of fall of recovery current	$di(rec)max/dt$					$T_j=125^\circ C$		43		
Reverse recovery energy	E_{rec}					$T_j=25^\circ C$		0.62		
						$T_j=125^\circ C$		1.29		
Thermal resistance chip to heatsink per chip	R_{thJH}	Thermal grease thickness \leq 50um $\lambda = 1$ W/mK						10369 10454		A/ μ s
								0.15 0.35		mWs
								1.94		K/W

DC link Capacitor

C value	C							47		nF
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Thermistor

Rated resistance	R					$T_j=25^\circ C$		22000		Ω
Deviation of R25	$\Delta R/R$	R100=1486 Ω				$T_c=100^\circ C$	-5		+5	%
Power dissipation	P					$T_c=100^\circ C$		200		mW
Power dissipation constant						$T_j=25^\circ C$		2		mW/K
B-value	$B_{(25/50)}$	Tol. \pm 3%				$T_j=25^\circ C$		3950		K
B-value	$B_{(25/100)}$	Tol. \pm 3%				$T_j=25^\circ C$		3996		K
Vincotech NTC Reference						$T_j=25^\circ C$			B	

Pseudo H-Bridge

Figure 1 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$

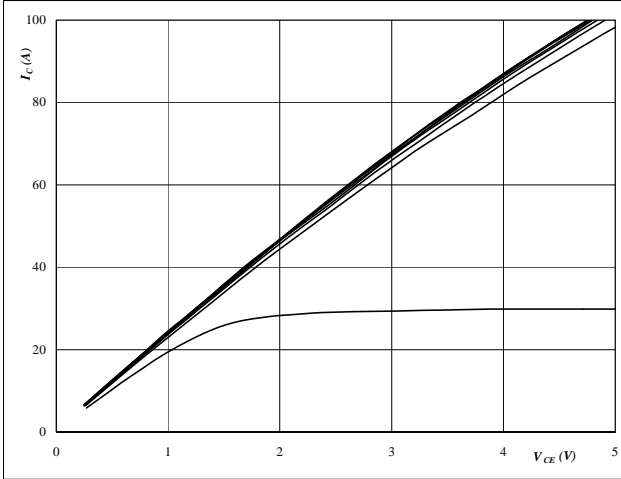

At
 $t_p = 250 \mu s$
 $T_j = 25 \text{ } ^\circ C$
 V_{GE} from 0 V to 20 V in steps of 2 V

Figure 2 MOSFET

Typical output characteristics

$I_C = f(V_{CE})$

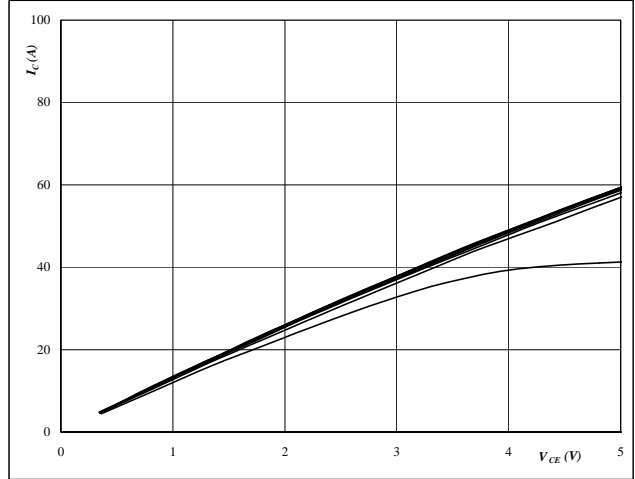
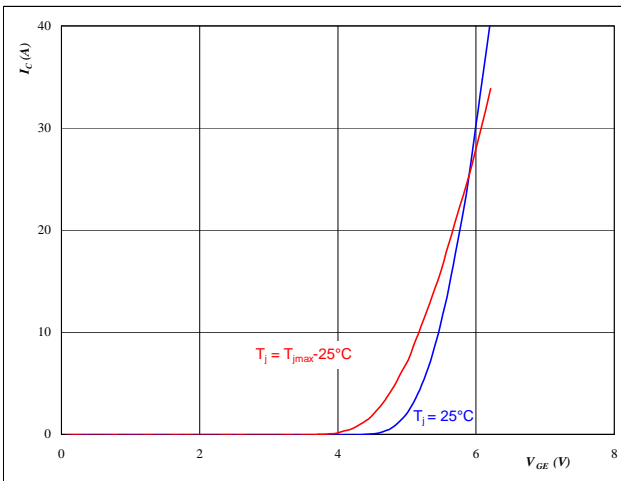

At
 $t_p = 250 \mu s$
 $T_j = 125 \text{ } ^\circ C$
 V_{GE} from 0 V to 20 V in steps of 2 V

Figure 3 MOSFET

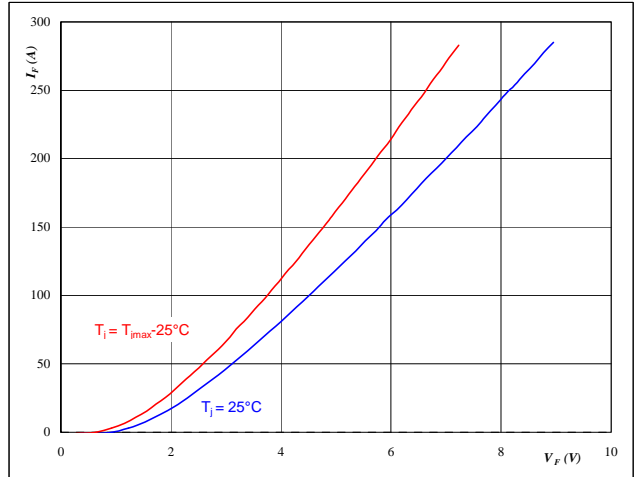
Typical transfer characteristics

$I_C = f(V_{GE})$


At
 $t_p = 250 \mu s$
 $V_{CE} = 10 \text{ V}$
Figure 4 FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$

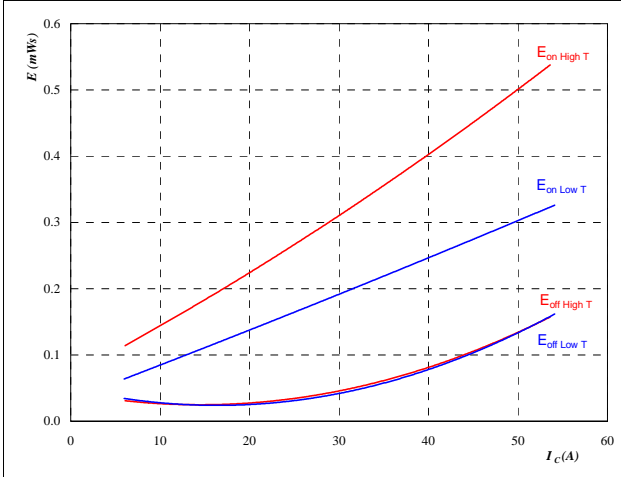

At
 $t_p = 250 \mu s$

Pseudo H-Bridge

Figure 5 MOSFET

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



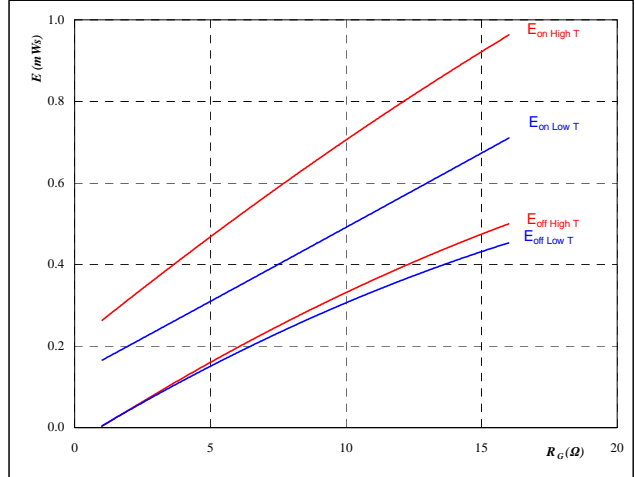
With an inductive load at

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

Figure 6 MOSFET

Typical switching energy losses as a function of gate resistor

$$E = f(R_G)$$



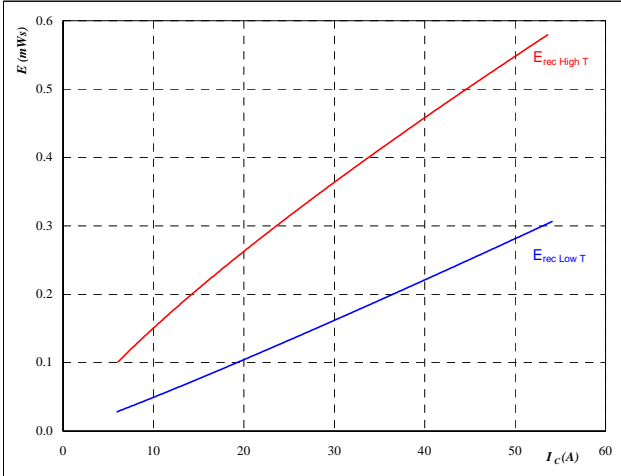
With an inductive load at

$T_J =$	25/125	°C
$V_{CE} =$	400	V
$V_{GE} =$	10	V
$I_C =$	30	A

Figure 7 FWD

Typical reverse recovery energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



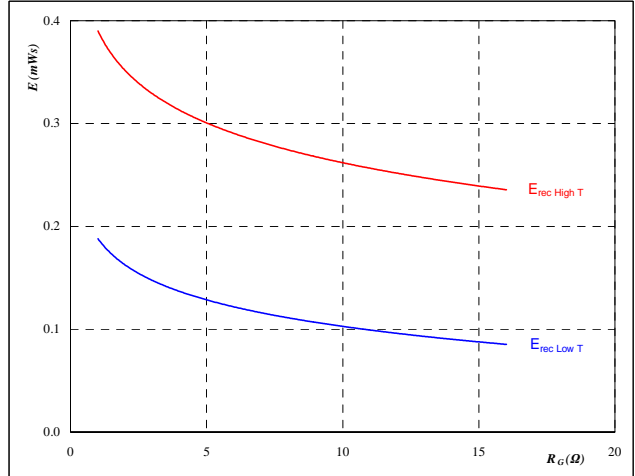
With an inductive load at

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

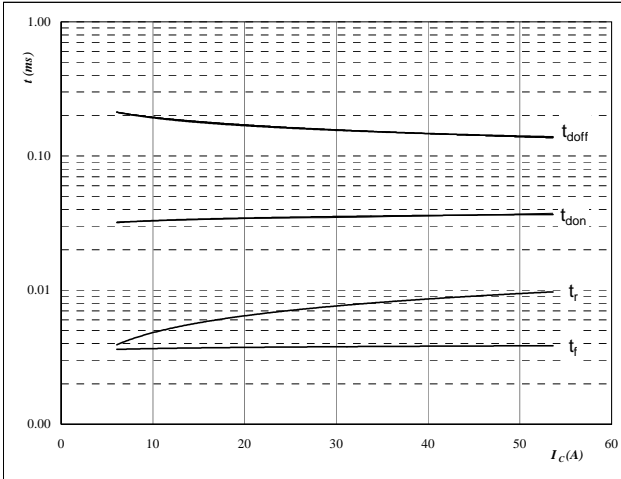
$T_J =$	25/125	°C
$V_{CE} =$	400	V
$V_{GE} =$	10	V
$I_C =$	30	A

Pseudo H-Bridge

Figure 9 MOSFET

Typical switching times as a function of collector current

$t = f(I_C)$



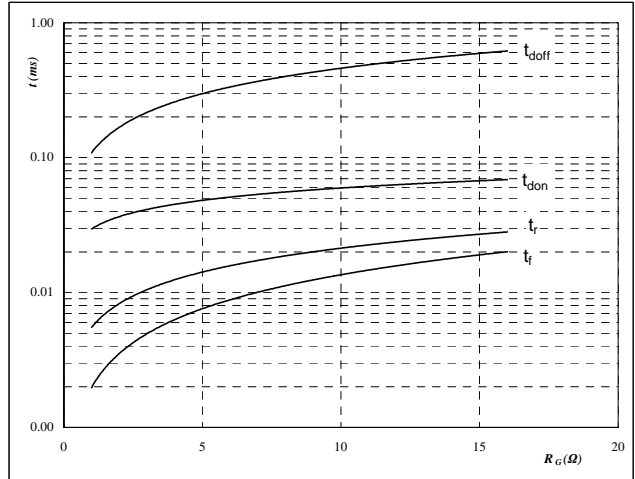
With an inductive load at

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

Figure 10 MOSFET

Typical switching times as a function of gate resistor

$t = f(R_G)$



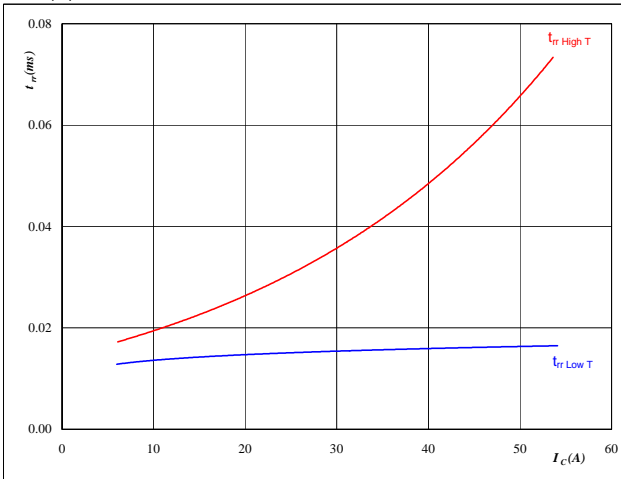
With an inductive load at

$T_j =$	125	°C
$V_{CE} =$	400	V
$V_{GE} =$	10	V
$I_C =$	30	A

Figure 11 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

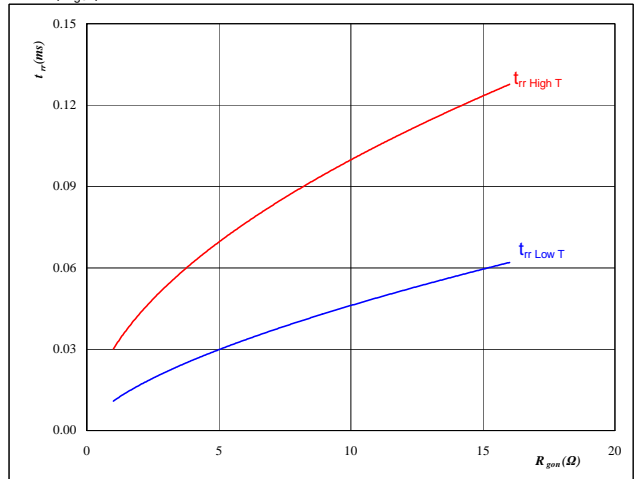

At

$T_j =$	25/125	°C
$V_{CE} =$	400	V
$V_{GE} =$	10	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

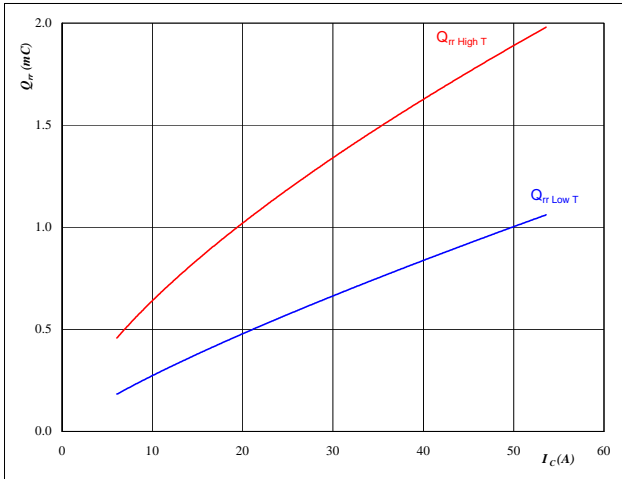
$T_j =$	25/125	°C
$V_R =$	400	V
$I_F =$	30	A
$V_{GE} =$	10	V

Pseudo H-Bridge

Figure 13 FWD

Typical reverse recovery charge as a function of collector current

$$Q_{rr} = f(I_c)$$

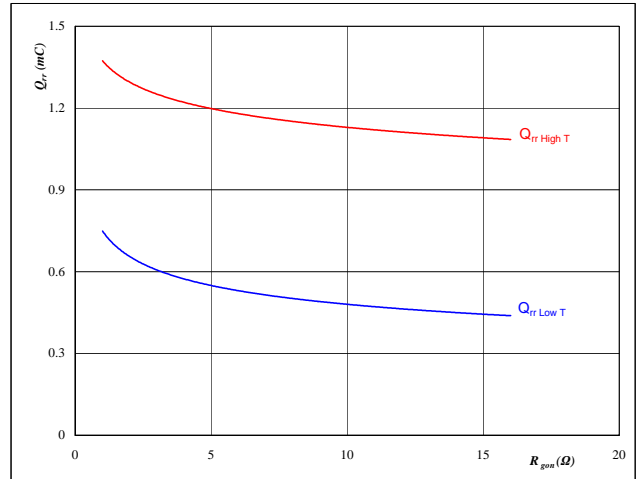


At
 $T_j = 25/125$ °C
 $V_{CE} = 400$ V
 $V_{GE} = 10$ V
 $R_{gon} = 2$ Ω

Figure 14 FWD

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

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

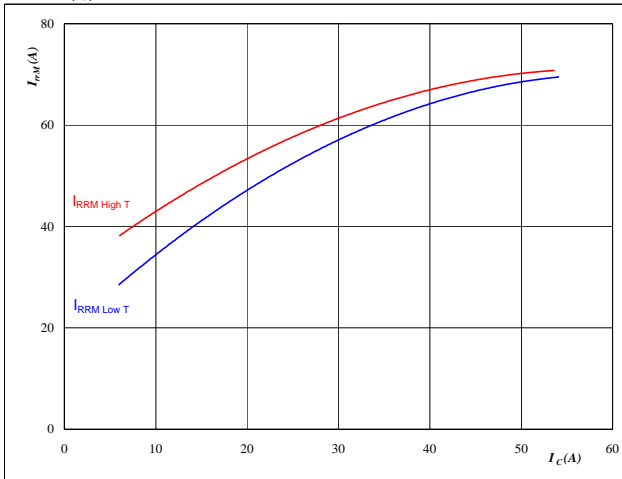


At
 $T_j = 25/125$ °C
 $V_R = 400$ V
 $I_F = 30$ A
 $V_{GE} = 10$ V

Figure 15 FWD

Typical reverse recovery current as a function of collector current

$$I_{RRM} = f(I_c)$$

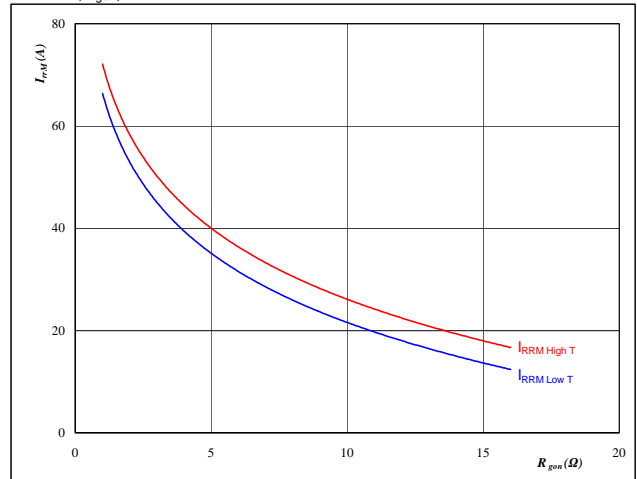


At
 $T_j = 25/125$ °C
 $V_{CE} = 400$ V
 $V_{GE} = 10$ V
 $R_{gon} = 2$ Ω

Figure 16 FWD

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

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



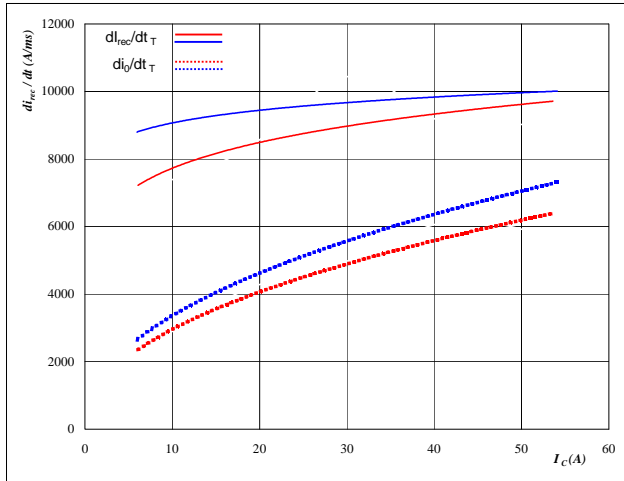
At
 $T_j = 25/125$ °C
 $V_R = 400$ V
 $I_F = 30$ A
 $V_{GE} = 10$ V

Pseudo H-Bridge

Figure 17 FWD

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

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

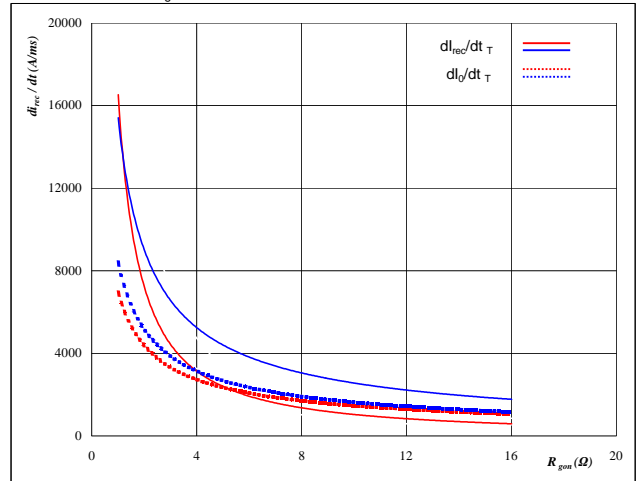


At
 $T_j = 25/125 \text{ } ^\circ\text{C}$
 $V_{CE} = 400 \text{ V}$
 $V_{GE} = 10 \text{ V}$
 $R_{gon} = 2 \text{ } \Omega$

Figure 18 FWD

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

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

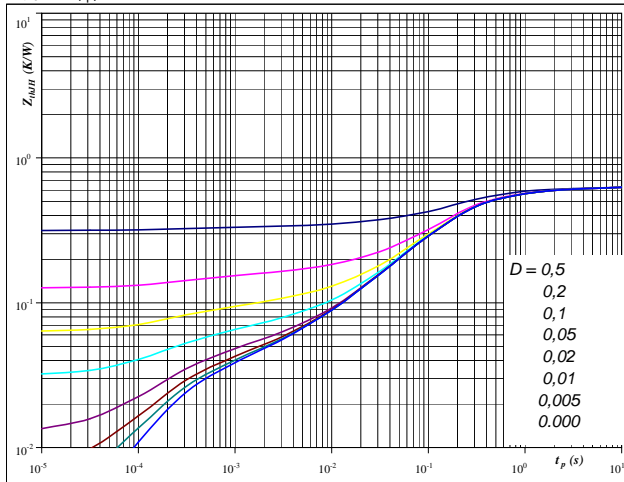


At
 $T_j = 25/125 \text{ } ^\circ\text{C}$
 $V_R = 400 \text{ V}$
 $I_F = 30 \text{ A}$
 $V_{GE} = 10 \text{ V}$

Figure 19 MOSFET

IGBT transient thermal impedance as a function of pulse width

$$Z_{thJH} = f(t_p)$$



At
 $D = t_p / T$
 $R_{thJH} = 0.63 \text{ K/W}$

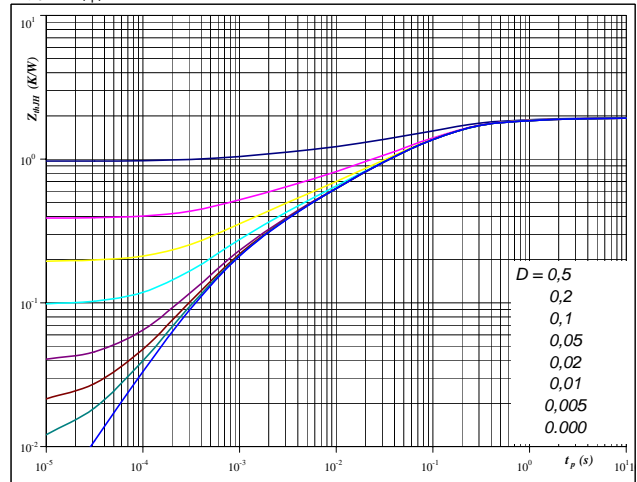
IGBT thermal model values

R (C/W)	Tau (s)
0.04	5.1E+00
0.08	1.0E+00
0.30	2.1E-01
0.14	8.6E-02
0.03	1.3E-02
0.02	1.4E-03

Figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$$Z_{thJH} = f(t_p)$$



At
 $D = t_p / T$
 $R_{thJH} = 1.94 \text{ K/W}$

FWD thermal model values

R (C/W)	Tau (s)
0.05	6.0E+00
0.14	8.1E-01
0.72	1.4E-01
0.42	4.5E-02
0.33	1.0E-02
0.19	1.8E-03

Pseudo H-Bridge

Figure 21 MOSFET

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

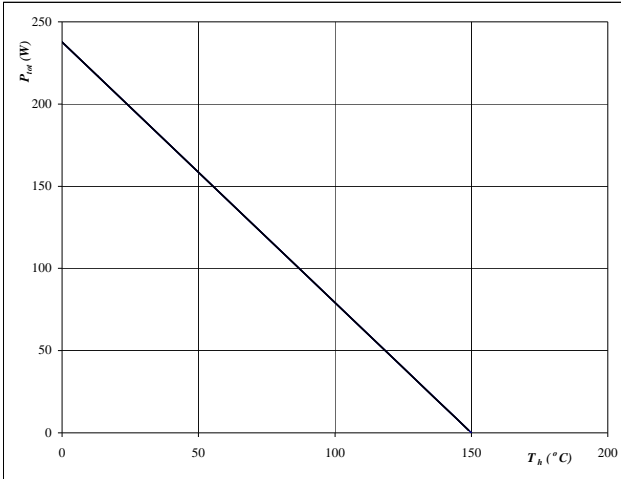

At
 $T_j = 150$ °C

Figure 22 MOSFET

Collector current as a function of heatsink temperature

$$I_C = f(T_h)$$

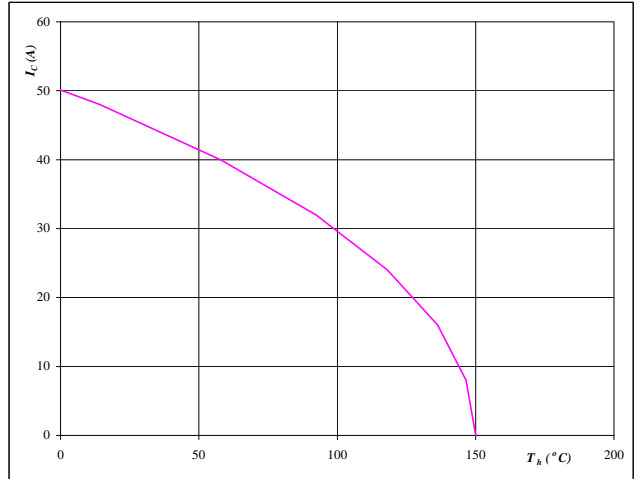

At
 $T_j = 150$ °C
 $V_{GE} = 15$ V

Figure 23 FWD

Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$

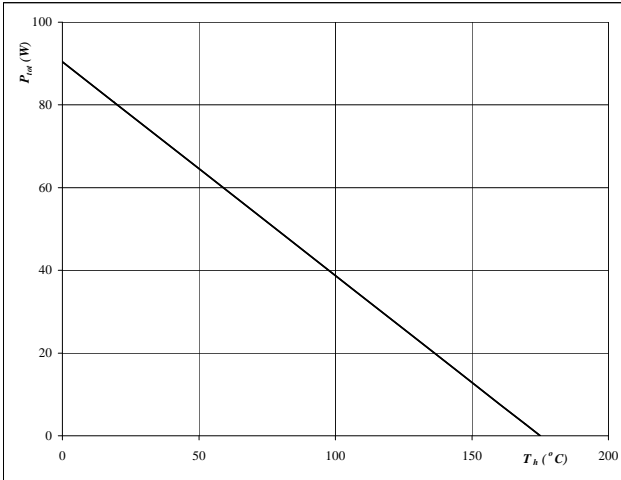
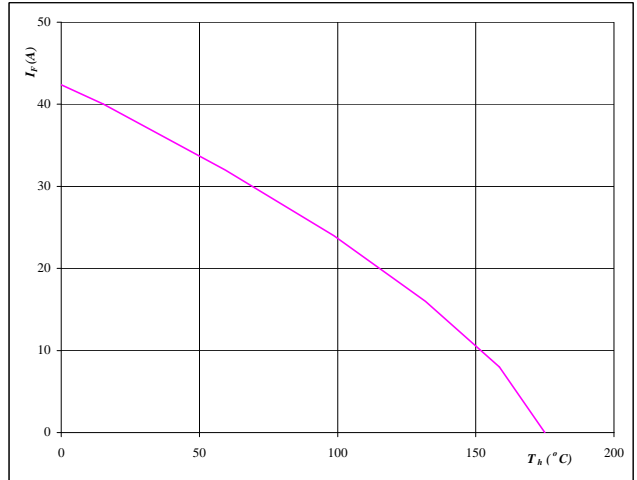

At
 $T_j = 175$ °C

Figure 24 FWD

Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$

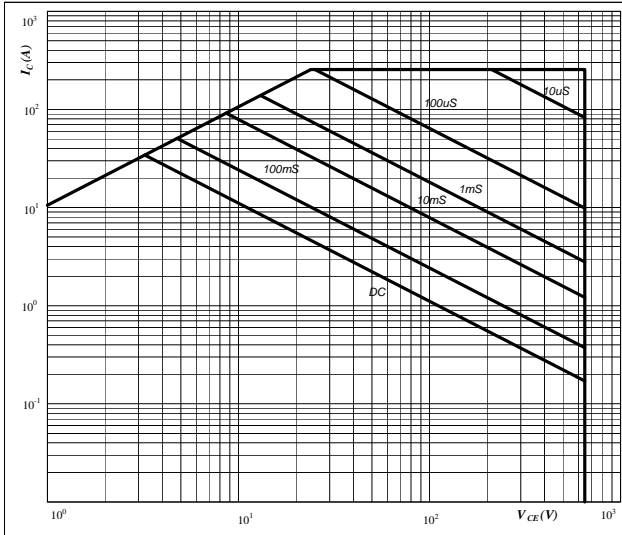

At
 $T_j = 175$ °C

Pseudo H-Bridge

Figure 25 MOSFET

Safe operating area as a function of collector-emitter voltage

$$I_C = f(V_{CE})$$

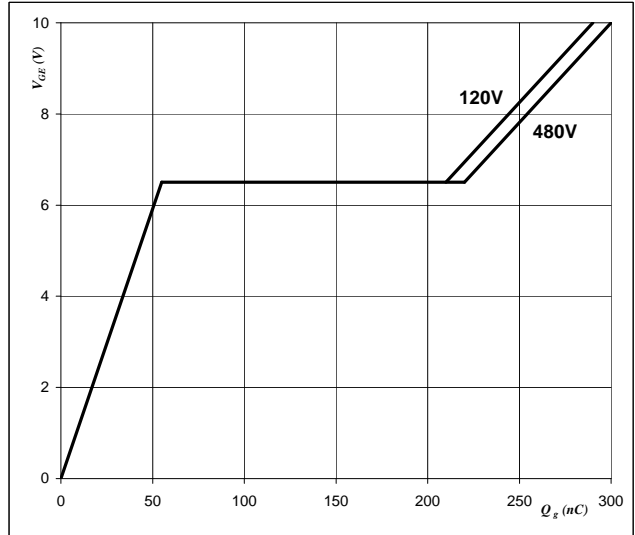


At
 D = single pulse
 Th = 80 °C
 $V_{GE} = 15$ V
 $T_j = T_{jmax}$ °C

Figure 26 MOSFET

Gate voltage vs Gate charge

$$V_{GE} = f(Q_g)$$



At
 $I_C = 50$ A

INPUT BOOST

Figure 1 BOOST MOSFET
Typical output characteristics

$I_D = f(V_{DS})$

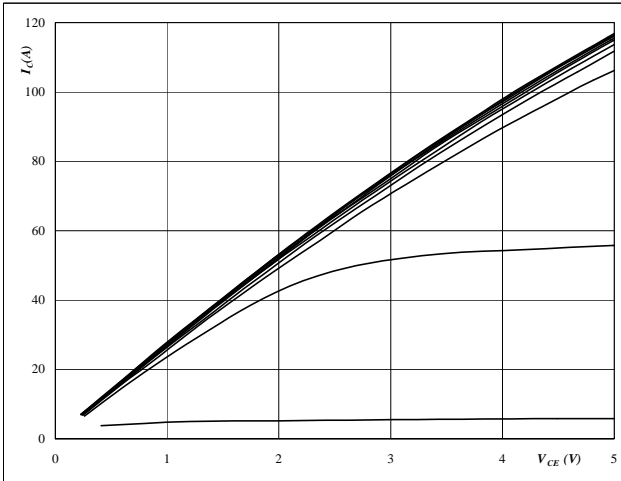

At
 $t_p = 250 \mu s$
 $T_j = 25 \text{ } ^\circ C$
 V_{GS} from 3 V to 13 V in steps of 1 V

Figure 2 BOOST MOSFET
Typical output characteristics

$I_D = f(V_{DS})$

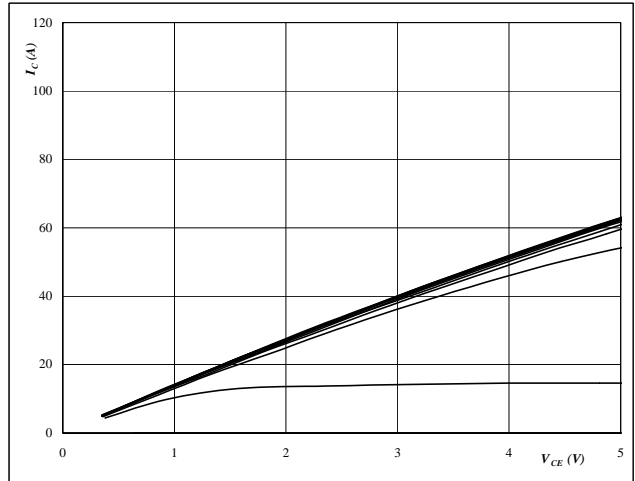
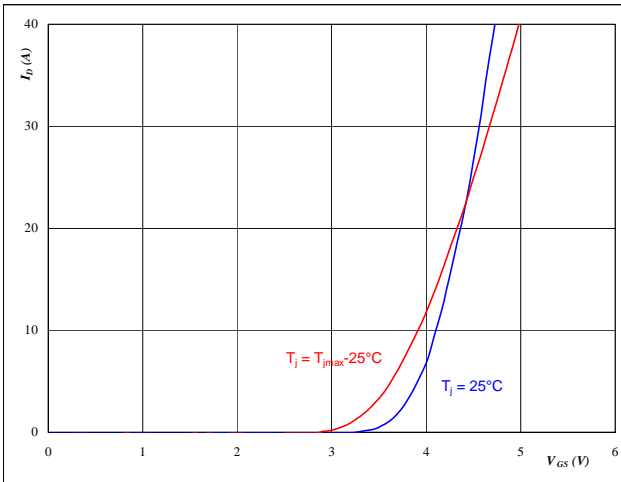
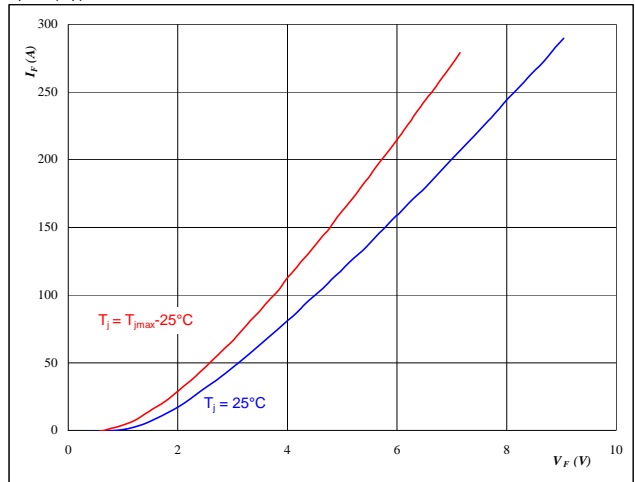

At
 $t_p = 250 \mu s$
 $T_j = 125 \text{ } ^\circ C$
 V_{GS} from 3 V to 13 V in steps of 1 V

Figure 3 BOOST MOSFET
Typical transfer characteristics

$I_D = f(V_{GS})$


At
 $t_p = 250 \mu s$
 $V_{DS} = 10 V$
Figure 4 BOOST FWD
Typical diode forward current as a function of forward voltage

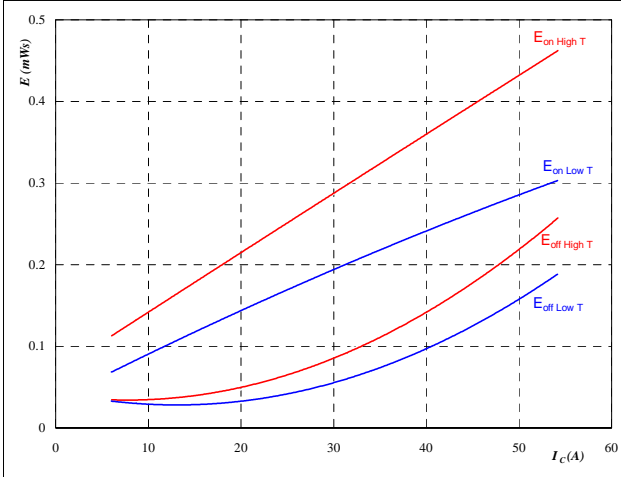
$I_F = f(V_F)$


At
 $t_p = 250 \mu s$

INPUT BOOST

Figure 5 BOOST MOSFET
**Typical switching energy losses
as a function of collector current**

$$E = f(I_D)$$

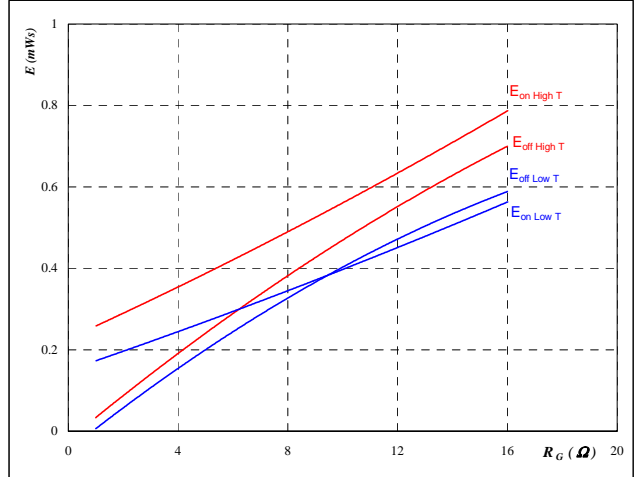


With an inductive load at

$T_J =$	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**

$$E = f(R_G)$$

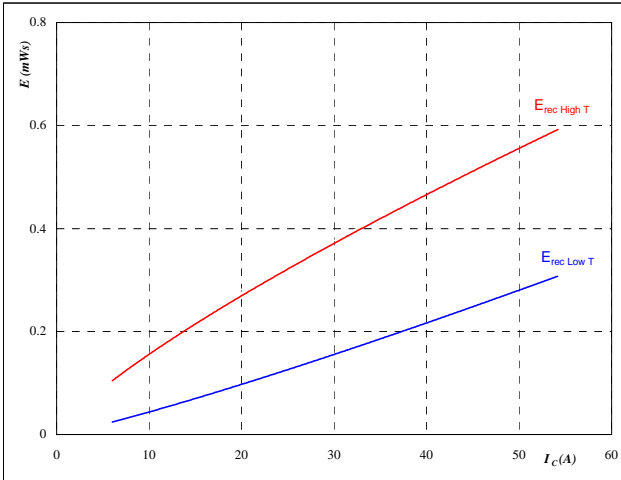


With an inductive load at

$T_J =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	10	V
$I_D =$	30	A

Figure 7 BOOST FWD
**Typical reverse recovery energy loss
as a function of collector (drain) current**

$$E_{rec} = f(I_c)$$

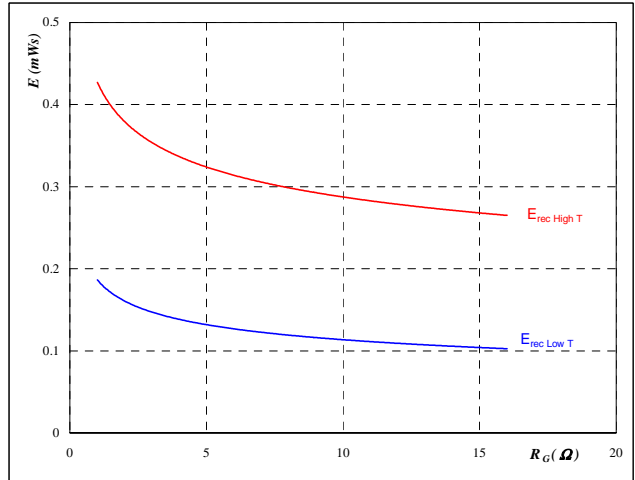


With an inductive load at

$T_J =$	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**

$$E_{rec} = f(R_G)$$



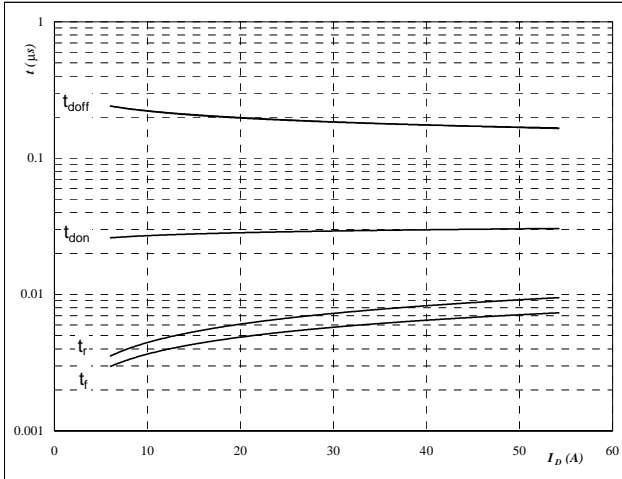
With an inductive load at

$T_J =$	25/125	°C
$V_{DS} =$	400	V
$V_{GS} =$	10	V
$I_D =$	30	A

INPUT BOOST

Figure 9 BOOST MOSFET
Typical switching times as a function of collector current

$$t = f(I_C)$$

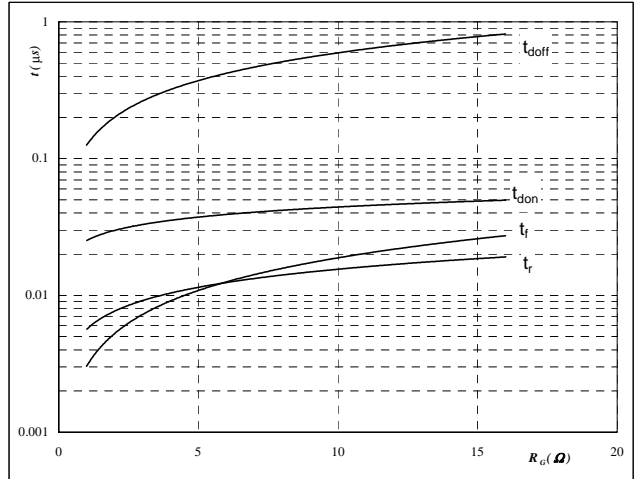


With an inductive load at

$T_j =$	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

$$t = f(R_G)$$

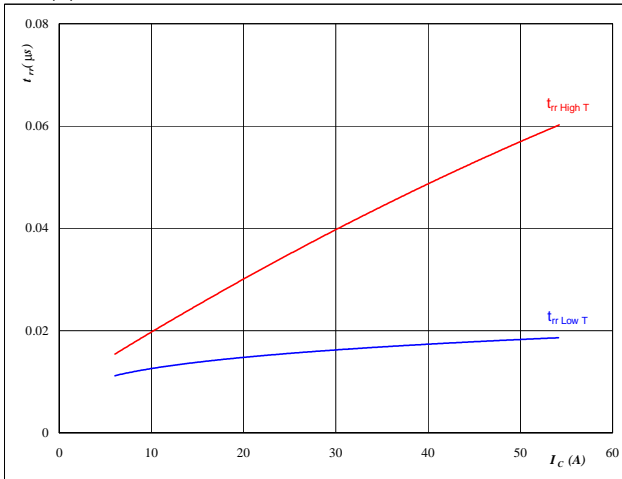


With an inductive load at

$T_j =$	125	°C
$V_{DS} =$	400	V
$V_{GS} =$	10	V
$I_C =$	30	A

Figure 11 BOOST FWD
Typical reverse recovery time as a function of collector current

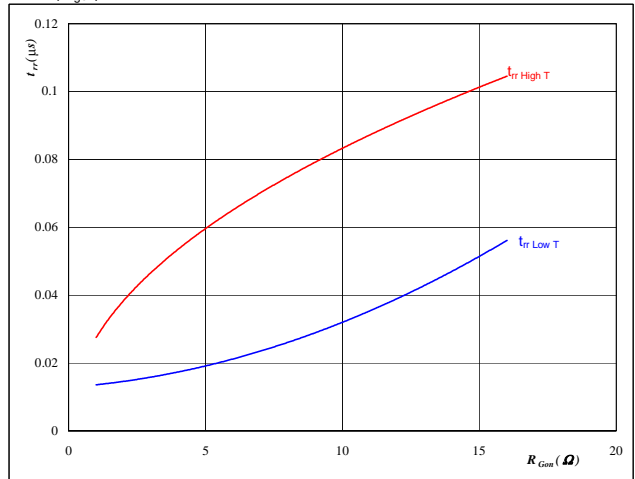
$$t_{rr} = f(I_C)$$


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

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

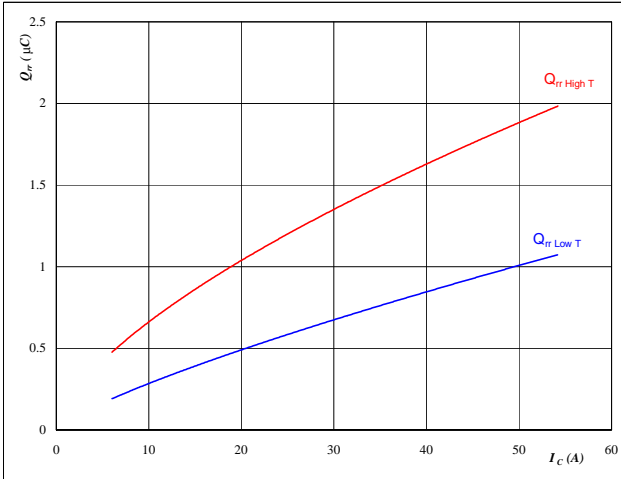

At

$T_j =$	25/125	°C
$V_R =$	400	V
$I_F =$	30	A
$V_{GS} =$	10	V

INPUT BOOST

Figure 13 BOOST FWD
Typical reverse recovery charge as a function of collector current

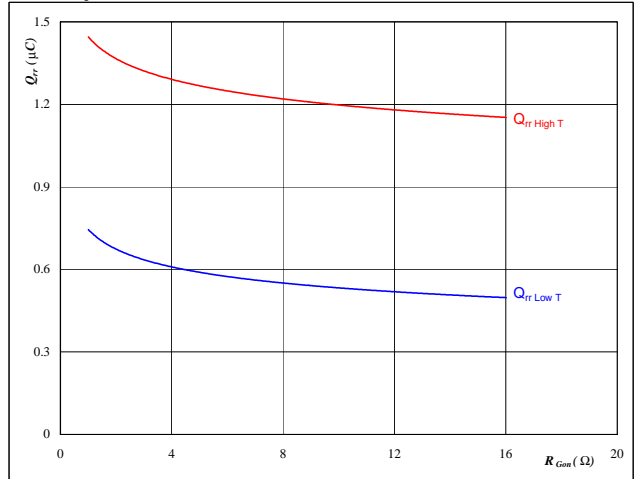
$$Q_{rr} = f(I_C)$$



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

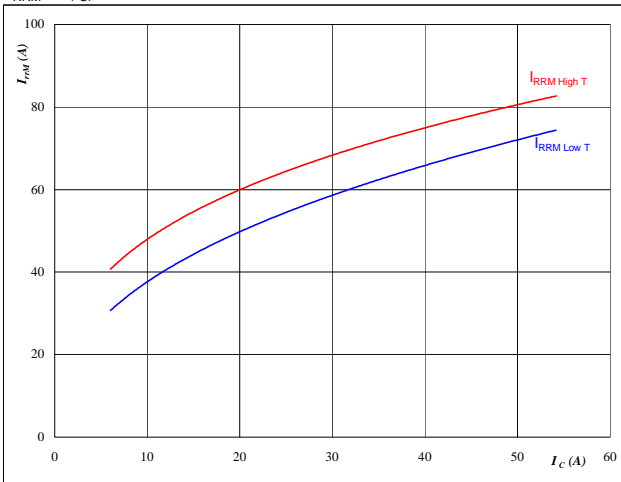
$$Q_{rr} = f(R_{gon})$$



At
 $T_j = 25/125$ °C
 $V_R = 400$ V
 $I_F = 30$ A
 $V_{GS} = 10$ V

Figure 15 BOOST FWD
Typical reverse recovery current as a function of collector current

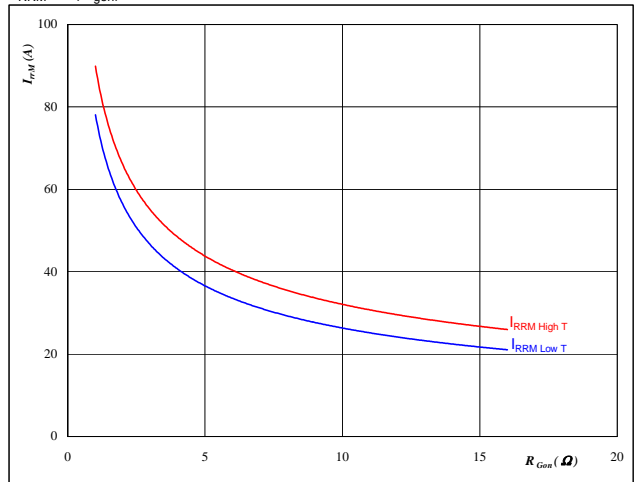
$$I_{RRM} = f(I_C)$$



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

Figure 16 BOOST FWD
Typical reverse recovery current as a function of IGBT turn on gate resistor

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



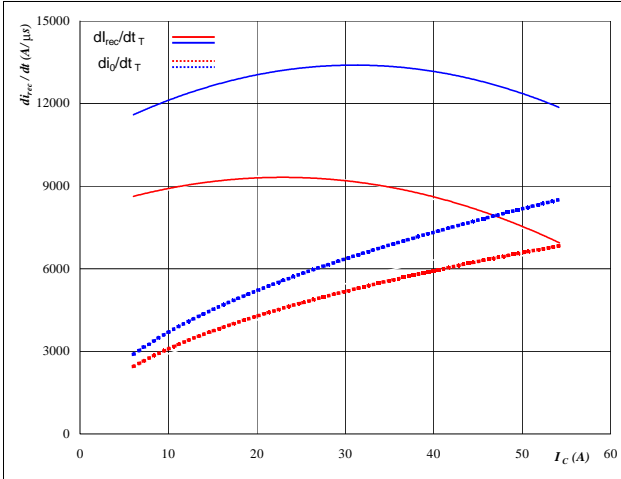
At
 $T_j = 25/125$ °C
 $V_R = 400$ V
 $I_F = 30$ A
 $V_{GS} = 10$ V

INPUT BOOST

Figure 17 BOOST FWD

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

$$di_o/dt, di_{rec}/dt = f(I_c)$$

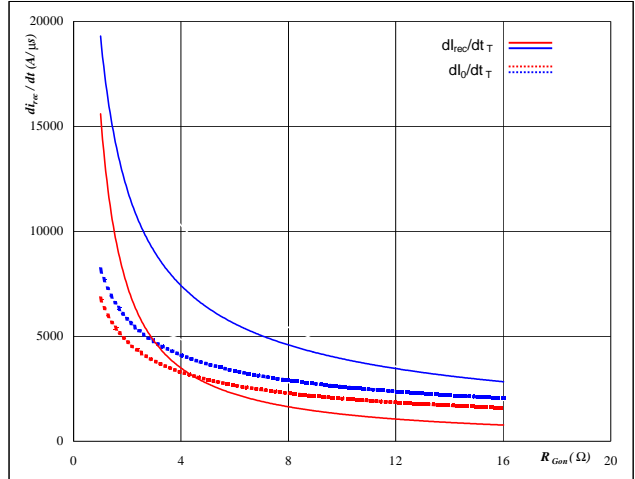


At
 $T_j = 25/125$ °C
 $V_{CE} = 400$ V
 $V_{GE} = 10$ V
 $R_{gon} = 2$ Ω

Figure 18 BOOST FWD

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

$$di_o/dt, di_{rec}/dt = f(R_{gon})$$

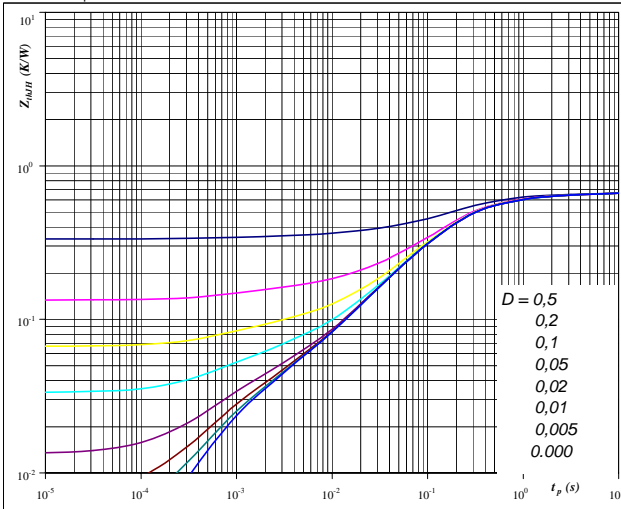


At
 $T_j = 25/125$ °C
 $V_R = 400$ V
 $I_F = 30$ A
 $V_{GS} = 10$ V

Figure 19 BOOST MOSFET

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

$$Z_{thJH} = f(t_p)$$



At
 $D = t_p / T$
 $R_{thJH} = 0.67$ K/W

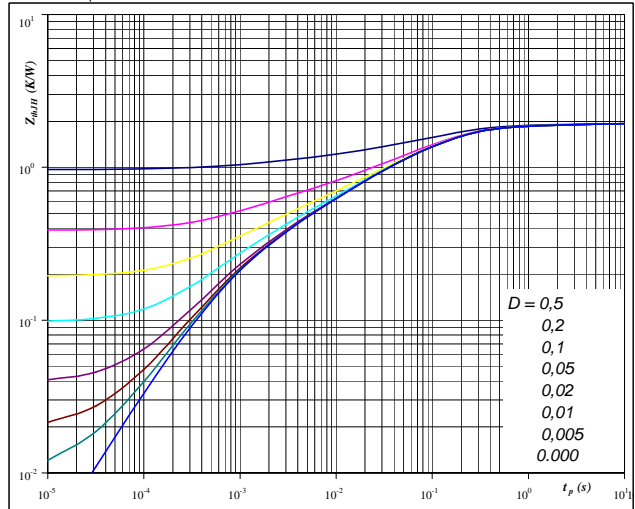
IGBT thermal model values

R (C/W)	Tau (s)
3.56E-02	5.26E+00
8.98E-02	9.94E-01
3.76E-01	1.88E-01
1.04E-01	6.08E-02
3.74E-02	1.20E-02
2.56E-02	9.33E-04

Figure 20 BOOST FWD

FWD transient thermal impedance as a function of pulse width

$$Z_{thJH} = f(t_p)$$



At
 $D = t_p / T$
 $R_{thJH} = 1.94$ K/W

FWD thermal model values

R (C/W)	Tau (s)
4.65E-02	5.96E+00
1.38E-01	8.06E-01
7.19E-01	1.42E-01
4.17E-01	4.54E-02
3.26E-01	1.02E-02
1.85E-01	1.84E-03

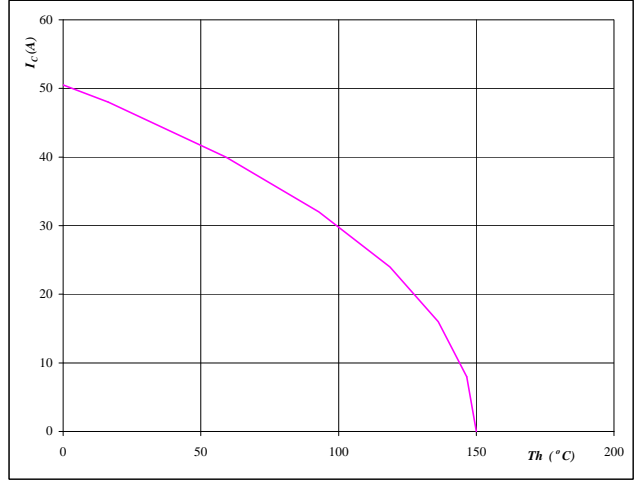
INPUT BOOST

Figure 21 BOOST MOSFET
Power dissipation as a function of heatsink temperature

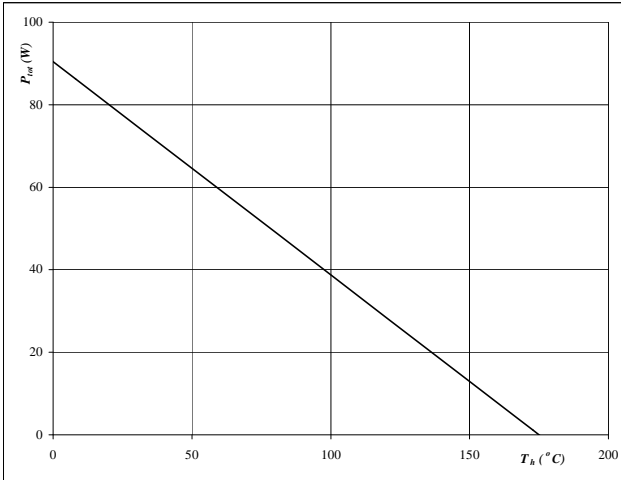
$$P_{tot} = f(T_h)$$


At
 $T_j = 150 \text{ °C}$
Figure 22 BOOST MOSFET
Collector/Drain current as a function of heatsink temperature

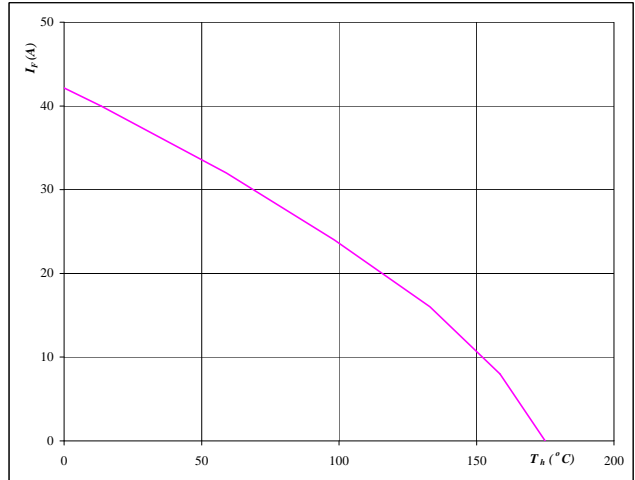
$$I_C = f(T_h)$$


At
 $T_j = 150 \text{ °C}$
 $V_{GS} = 10 \text{ V}$
Figure 23 BOOST FWD
Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$


At
 $T_j = 175 \text{ °C}$
Figure 24 BOOST FWD
Forward current as a function of heatsink temperature

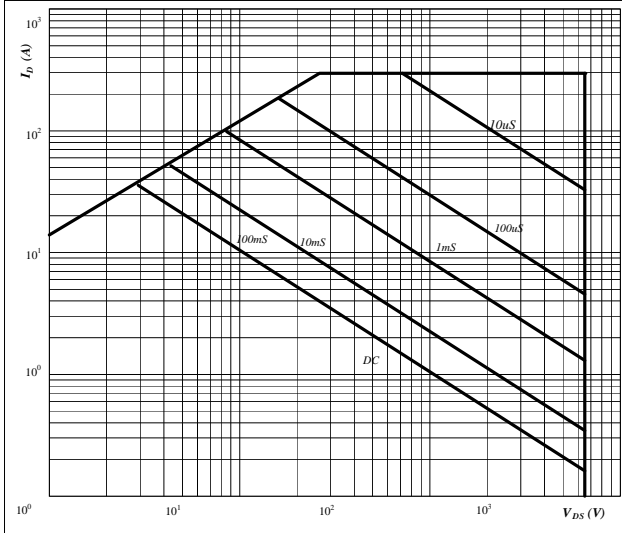
$$I_F = f(T_h)$$


At
 $T_j = 175 \text{ °C}$

INPUT BOOST

Figure 25 BOOST MOSFET
Safe operating area as a function of drain-source voltage

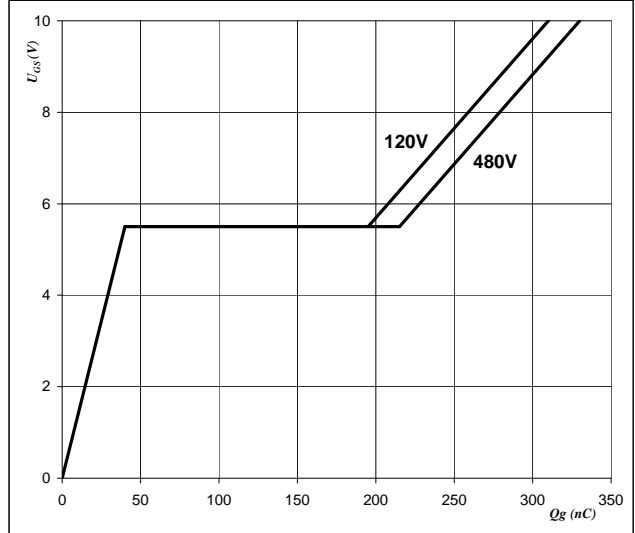
$$I_D = f(V_{DS})$$



At
 D = single pulse
 $T_n = 80$ °C
 $V_{GS} = 10$ V
 $T_j = T_{jmax}$ °C

Figure 26 BOOST MOSFET
Gate voltage vs Gate charge

$$V_{GS} = f(Q_g)$$

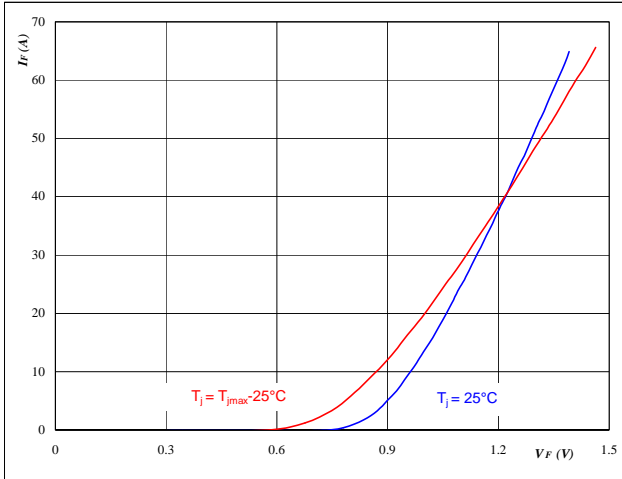


At
 $I_D = 50$ A

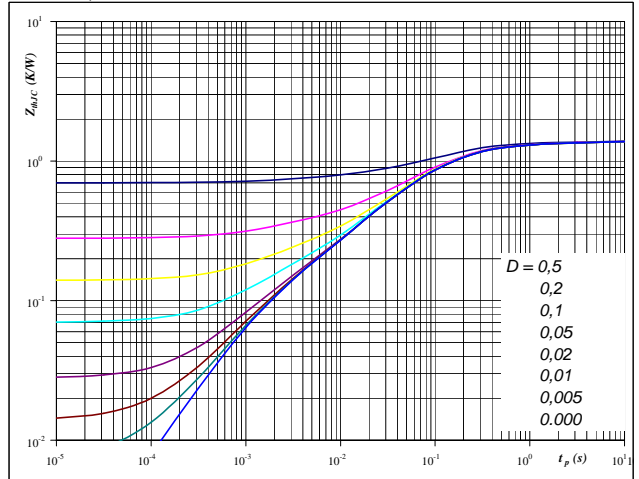
Bypass Diode

Figure 1 Bypass diode
Typical diode forward current as a function of forward voltage

$$I_F = f(V_F)$$


At
 $t_p = 250 \mu s$
Figure 2 Bypass diode
Diode transient thermal impedance as a function of pulse width

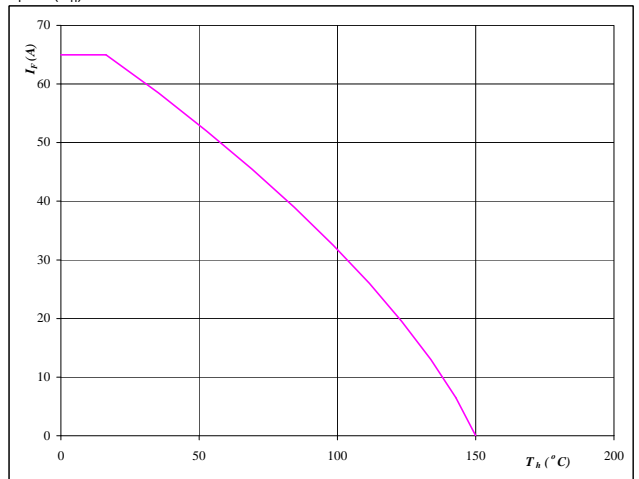
$$Z_{thJH} = f(t_p)$$


At
 $D = t_p / T$
 $R_{thJH} = 1.397 \text{ K/W}$
Figure 3 Bypass diode
Power dissipation as a function of heatsink temperature

$$P_{tot} = f(T_h)$$


At
 $T_j = 150 \text{ } ^\circ\text{C}$
Figure 4 Bypass diode
Forward current as a function of heatsink temperature

$$I_F = f(T_h)$$

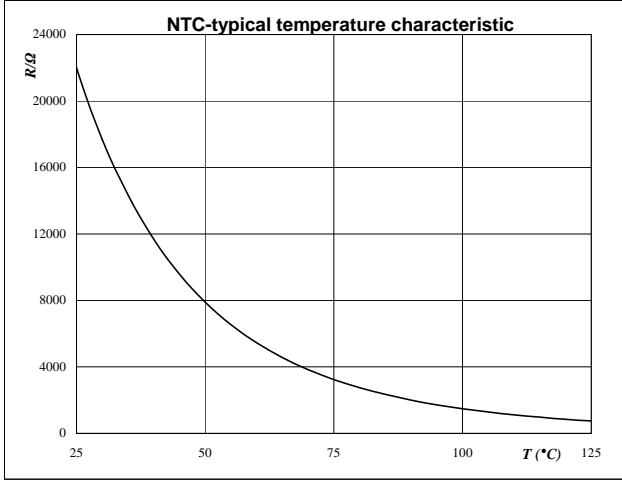

At
 $T_j = 150 \text{ } ^\circ\text{C}$

Thermistor

Figure 1 Thermistor

**Typical NTC characteristic
as a function of temperature**

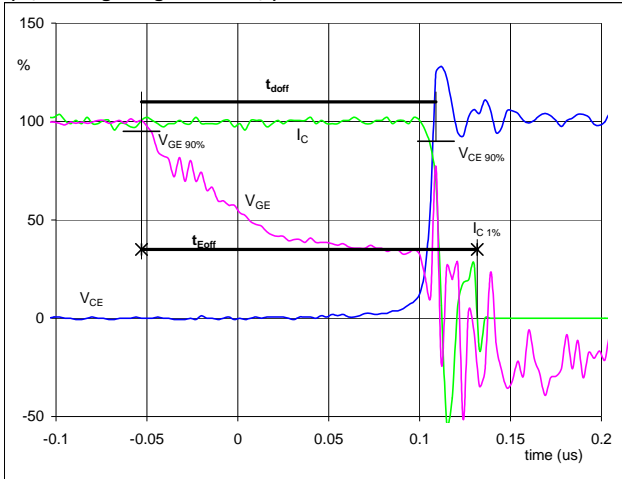
$$R_T = f(T)$$



Switching Definitions H-Bridge MOSFET

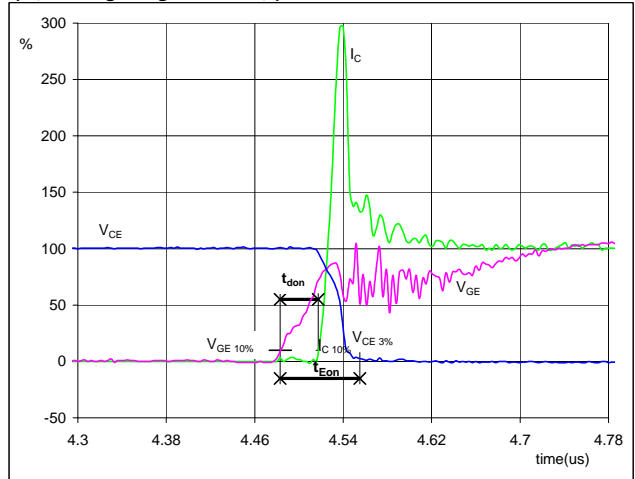
General conditions	
T_j	= 125 °C
R_{gon}	= 2 Ω
R_{goff}	= 2 Ω

Figure 1 H-Bridge MOSFET

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


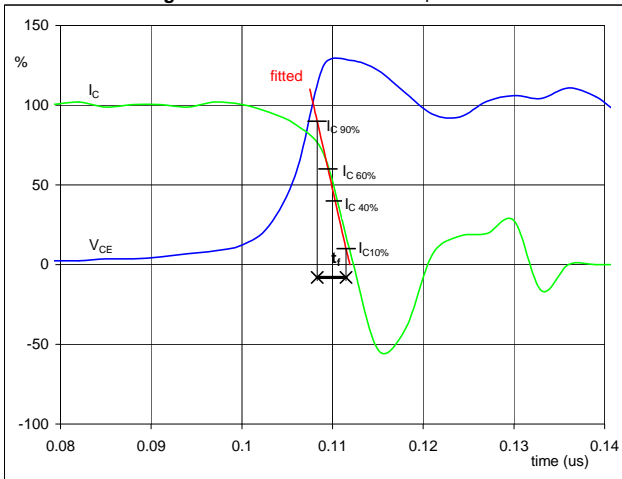
V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	400	V
I_C (100%) =	30	A
t_{doff} =	0.15	μ s
t_{Eoff} =	0.18	μ s

Figure 2 H-Bridge MOSFET

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


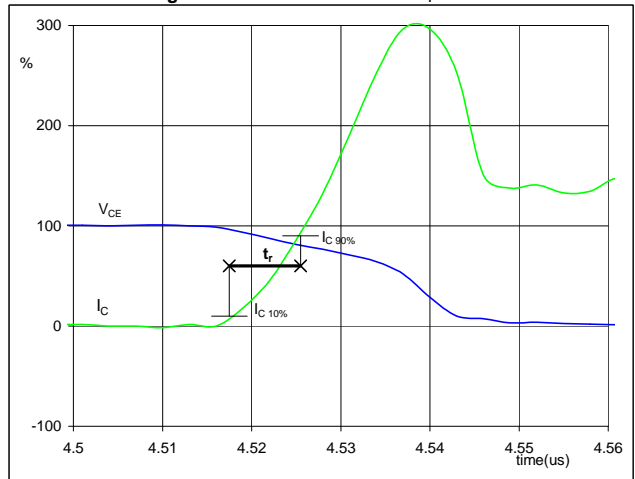
V_{GE} (0%) =	0	V
V_{GE} (100%) =	10	V
V_C (100%) =	400	V
I_C (100%) =	30	A
t_{don} =	0.04	μ s
t_{Eon} =	0.07	μ s

Figure 3 H-Bridge MOSFET

Turn-off Switching Waveforms & definition of t_f


V_C (100%) =	400	V
I_C (100%) =	30	A
t_f =	0.00	μ s

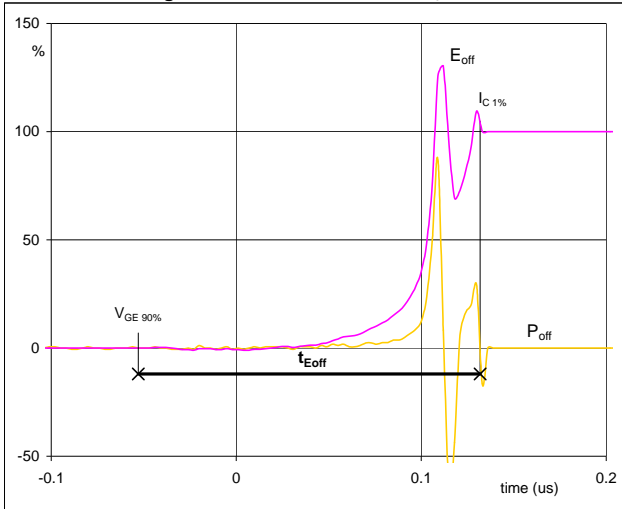
Figure 4 H-Bridge MOSFET

Turn-on Switching Waveforms & definition of t_r


V_C (100%) =	400	V
I_C (100%) =	30	A
t_r =	0.01	μ s

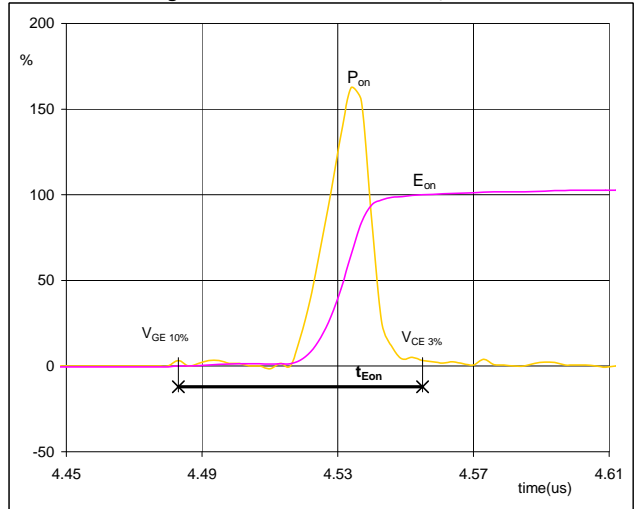
Switching Definitions H-Bridge MOSFET

Figure 5 H-Bridge MOSFET

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


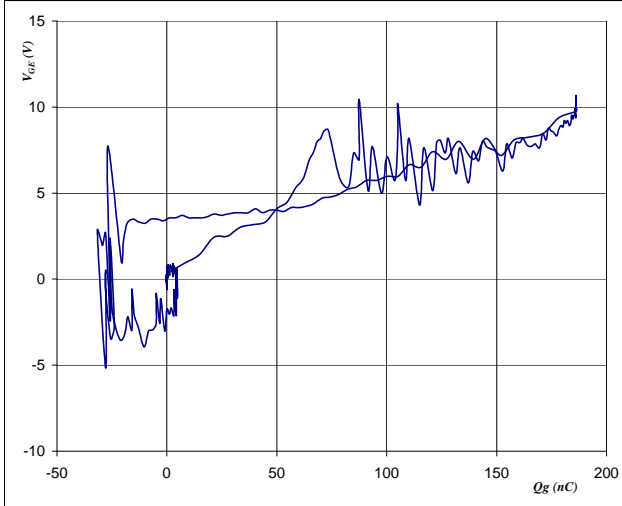
$P_{off}(100\%) =$	12.15	kW
$E_{off}(100\%) =$	0.05	mJ
$t_{Eoff} =$	0.18	μ s

Figure 6 H-Bridge MOSFET

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


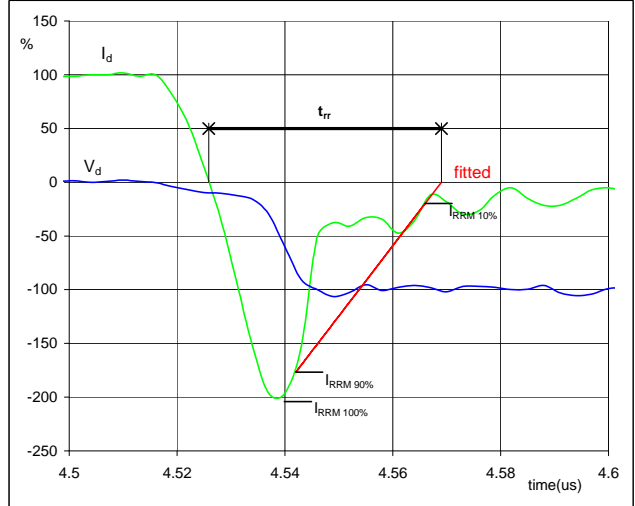
$P_{on}(100\%) =$	12.15	kW
$E_{on}(100\%) =$	0.31	mJ
$t_{Eon} =$	0.07	μ s

Figure 7 H-Bridge MOSFET

Gate voltage vs Gate charge (measured)


$V_{GEoff} =$	0	V
$V_{GEon} =$	10	V
$V_C(100\%) =$	400	V
$I_C(100\%) =$	30	A
$Q_g =$	186.04	nC

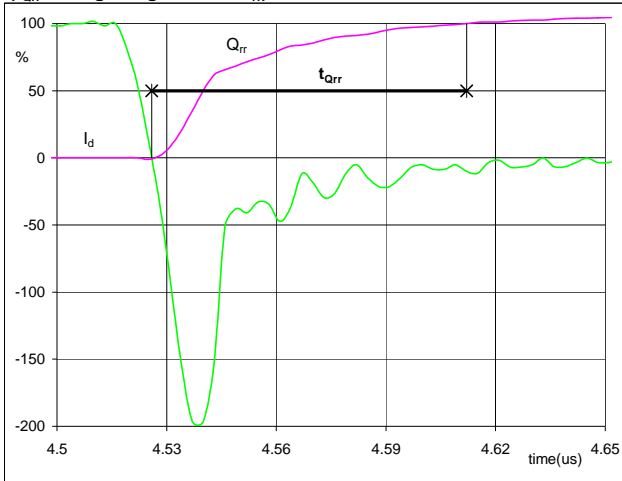
Figure 8 H-Bridge FWD

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


$V_d(100\%) =$	400	V
$I_d(100\%) =$	30	A
$I_{RRM}(100\%) =$	-61	A
$t_{rr} =$	0.04	μ s

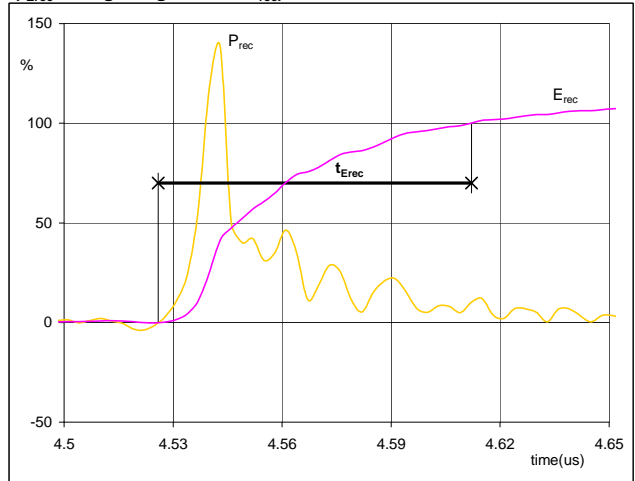
Switching Definitions H-Bridge MOSFET

Figure 9 H-Bridge FWD

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


I_d (100%) =	30	A
Q_{rr} (100%) =	1.29	μC
t_{Qrr} =	0.09	μs

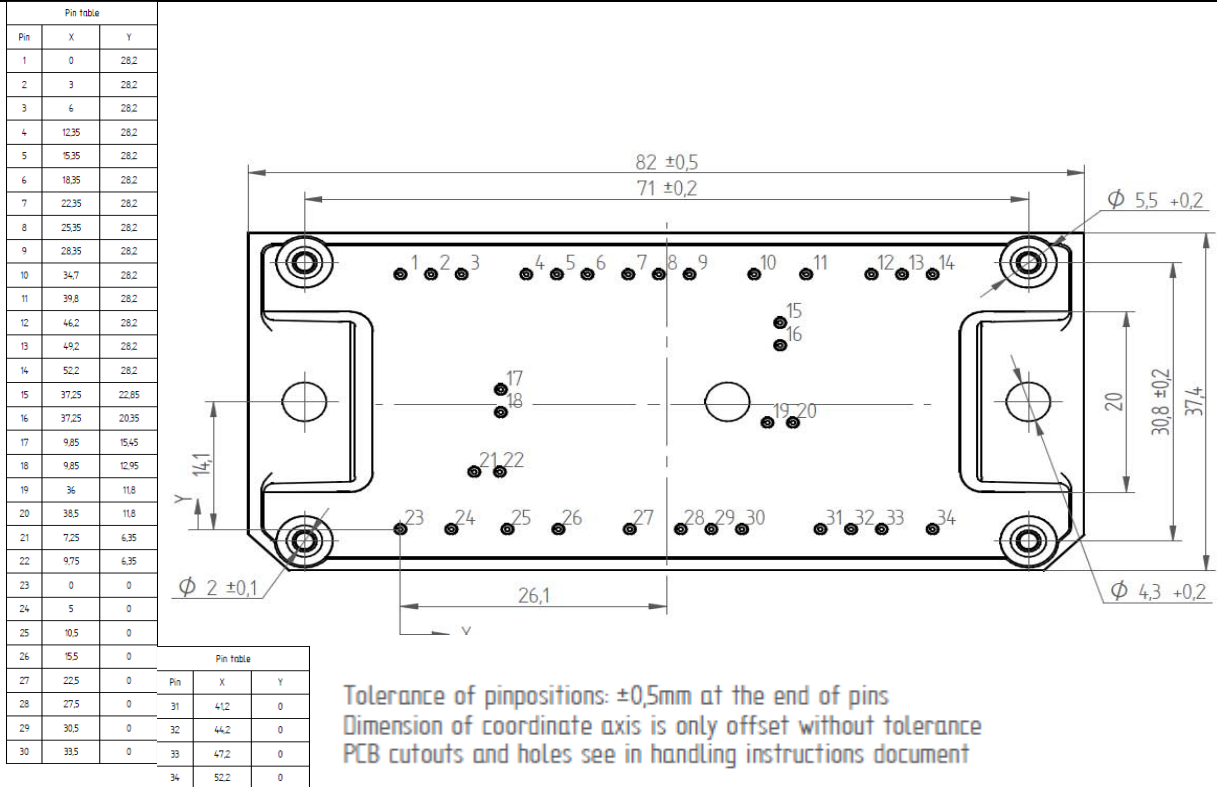
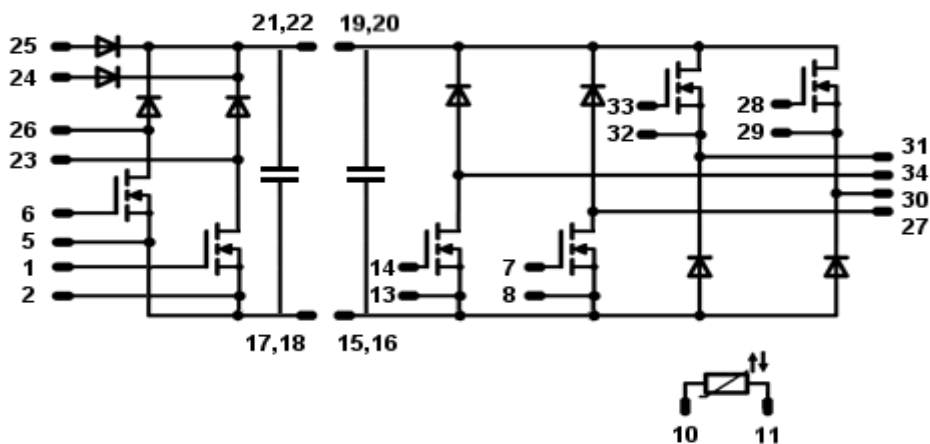
Figure 10 H-Bridge FWD

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


P_{rec} (100%) =	12.15	kW
E_{rec} (100%) =	0.35	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-FY07BIA041MF-M528E68	M528E68	M528E68

Outline

Pinout


Pins 3,4,9,12 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.

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