70-W612M3A1K8SC02-L300FP70
datasheet

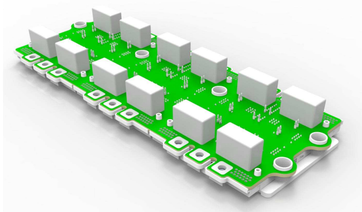
Vincotech

flow **MNPC 12w** — **1200 V / 1800 A**

Features

- Mixed voltage NPC
- Low inductive
- High power screw interface
- Integrated DC-snubber capacitors
- High accuracy NTC

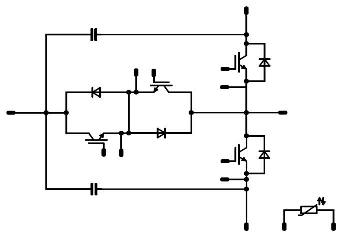
3x *flow* SCREW 4w 12mm housing



Target Applications

- Solar inverter
- UPS
- High Speed Motor Drive

Schematic



Types

- 70-W612M3A1K8SC02-L300FP70

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Half Bridge IGBT(T1 ,T4)					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1383 1618	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		5400	A
Turn off safe operating area		V_{CE} ≤ 1200V, T_j ≤ T_{op} max		3600	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	3123 4004	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150°C V_{GE} = 15V		10 800	μs V
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Neutral Point Diode(D5 ,D6)					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1005 1220	A
Repetitive peak forward current	I_{FRM}	t_p = 10ms, sin 180°		3600	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1321 1693	W
Maximum Junction Temperature	T_{jmax}			175	°C
Neutral Point IGBT(T2 ,T3)					
Collector-emitter break down voltage	V_{CE}			650	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1063 1447	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		5400	A
Turn off safe operating area		V_{CE} ≤ 1200V, T_j ≤ T_{op} max		3600	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1985 2544	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_{jmax}			175	°C
Half Bridge Diode(D2 ,D3)					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	1021 1218	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		5400	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80°C T_c = 80°C	2075 2660	W
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
DC link Capacitor					
Max.DC voltage	V_{MAX}			630	V
Operation Temperature	T_{OP}			-40…+105	°C
RMS Current	I_{RMS}	f = 10KHz ΔT = 10°C	$T_a \leq 85°C$	39	A
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(T_{jmax} - 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
Stage	CTI			>200	

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	
Half Bridge IGBT(T1 ,T4)										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0684	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		1800	25 125		2,16 2,42	2,5	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	1200		25			0,6	mA
Gate-emitter leakage current	I_{GES}		20	0		25			9000	nA
Integrated Gate resistor	R_{gint}	All gates paralleling						0,42		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 0,5 Ω R_{gon} = 0,5 Ω	+15/-10	350	1800	25 125		288 284		ns
Rise time	t_r					25 125		103 105		
Turn-off delay time	$t_{d(off)}$					25 125		447 373		
Fall time	t_f					25 125		63 96		
Turn-on energy loss per pulse	E_{on}					25 125		40,95 48,01		mWs
Turn-off energy loss per pulse	E_{off}					25 125		73,51 107,89		
Input capacitance	C_{ies}	f = 1MHz	0	25		25		112200		pF
Output capacitance	C_{oss}							6960		
Reverse transfer capacitance	C_{rss}							4200		
Gate charge	Q_G		±15	600	1800	25		14400		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,03		K/W
Thermal resistance chip to case	$R_{th(j-c)}$	$R_{th(j-c)}$= 0,75*$R_{th(j-s)}$						0,02		
Neutral Point Diode(D5 ,D6)										
Diode forward voltage	V_F				1800	25 125		1,64 1,61	2,4	V
Reverse leakage current	I_R			650		25			21,6	µA
Peak reverse recovery current	I_{RRM}	R_{gon} = 0,5 Ω	+15/-10	350	1800	25 125		588 883		A
Reverse recovery time	t_{rr}					25 125		223 302		ns
Reverse recovered charge	Q_{rr}					25 125		60,94 124,39		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		10380 9556		A/µs
Reverse recovered energy	E_{rec}					25 125		12,36 24,83		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,07		K/W
Thermal resistance chip to case	$R_{th(j-c)}$	$R_{th(j-c)}$= 0,75*$R_{th(j-s)}$						0,06		

Characteristic Values

Parameter	Symbol	Conditions	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 [°C]	Min	Typ	Max	Unit
Neutral Point IGBT(T2 ,T3)										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0288	25	5,1	5,80	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		1800	25 125		1,57 1,80	2,0	V
Collector-emitter cut-off incl diode	I_{CES}		0	1200		25			0,14	mA
Gate-emitter leakage current	I_{GES}		20	0		25			9000	nA
Integrated Gate resistor	R_{gint}	All gates paralleling						0,16		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 0,5 Ω R_{gon} = 0,5 Ω	+15/-8	350	1800	25 125		197 201		ns
Rise time	t_r					25 125		89 94		
Turn-off delay time	$t_{d(off)}$					25 125		246 268		
Fall time	t_f					25 125		44 65		
Turn-on energy loss per pulse	E_{on}					25 125		26,5 33,5		mWs
Turn-off energy loss per pulse	E_{off}					25 125		50,1 71,7		
Input capacitance	C_{ies}	f = 1MHz	0	25	1800	25		110880		pF
Output capacitance	C_{oss}							6912		
Reverse transfer capacitance	C_{rss}							3288		
Gate charge	Q_G		15	960	1800	25		19200		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,05		K/W
Thermal resistance chip to case	$R_{th(j-c)}$	$R_{th(j-c)}$= 0,75*$R_{th(j-s)}$						0,04		
Half Bridge Diode(D2 ,D3)										
Diode forward voltage	V_F				1800	25 125		2,51 2,54	2,9	V
Reverse leakage current	I_r			1200		25			2160	µA
Peak reverse recovery current	I_{RRM}	R_{gon} = 0,5 Ω	+15/-8	350	1800	25 125		910 1244		A
Reverse recovery time	t_{rr}					25 125		111 117		ns
Reverse recovered charge	Q_{rr}					25 125		62 165		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		20865 20295		A/µs
Reverse recovery energy	E_{rec}					125 125		11,52 35,92		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,05		K/W
Thermal resistance chip to case	$R_{th(j-c)}$	$R_{th(j-c)}$= 0,75*$R_{th(j-s)}$						0,04		
DC link Capacitor										
C value	C					25	3450	4080	4800	µF
Equivalent series resistance	ESR	f = 10KHz				25		1,58		mΩ
Tolerance							-10		+10	%
Dissipation factor		f = 1KHz				20			0,0004	
Climatic category								40/105/56		

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 [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R25	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		+5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1%				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1%				25		4000		K
Vincotech NTC Reference									I	
Module Properties										
Module inductance (from chips to PCB)	L_{sCE}							2		nH
Mounting torque for screws to heatsink	M_S	Screw M5 –according to the valid handling instructions FSWB-M-*-HI					4		6	Nm
Mounting torque for terminal screws	M_t	Screw M6 –according to the valid handling instructions FSWB-M-*-HI					2,5		5	Nm
Mounting torque for Interconn PCB screws	M	Screw M4 –according to the valid handling instructions FSWB-M-*-HI					2		2,2	Nm
Weight	m								1930	g

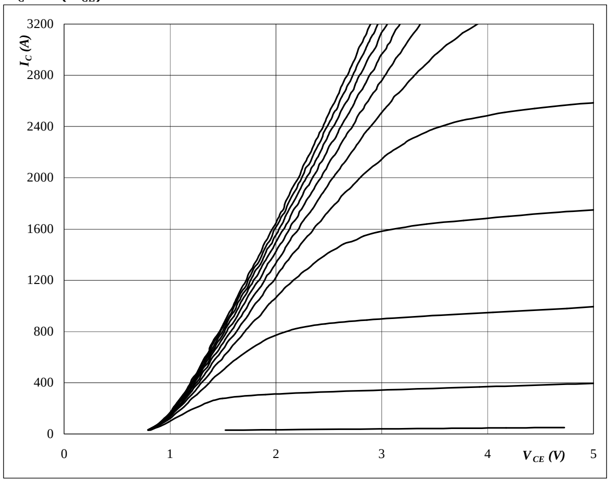
Half Bridge T1, T4 / D5, D6

Half Bridge IGBT and Neutral Point FWD

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



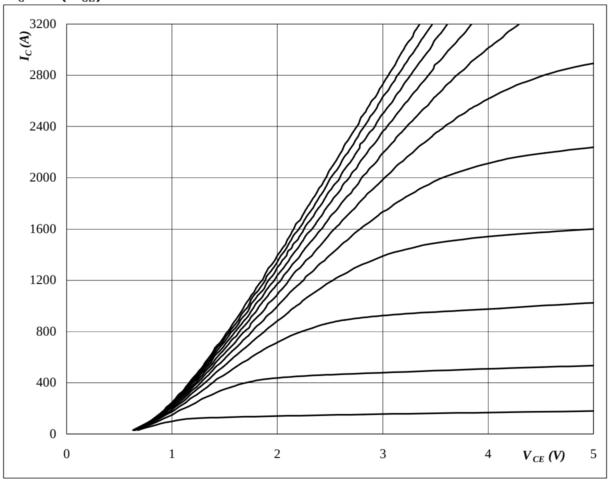
At

t_p =	350	µs
T_j =	25	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 2 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



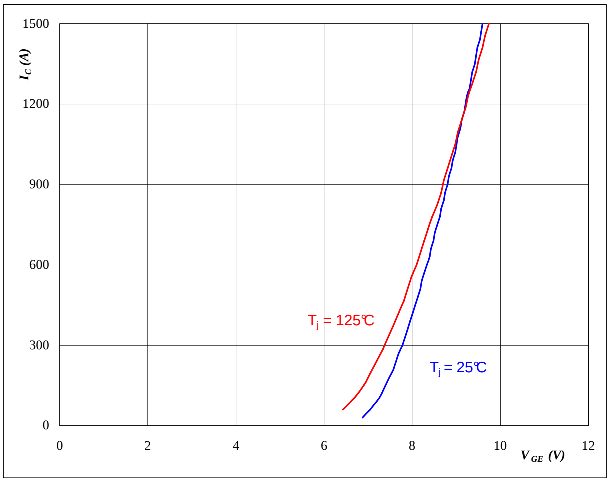
At

t_p =	350	µs
T_j =	125	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Figure 3 IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



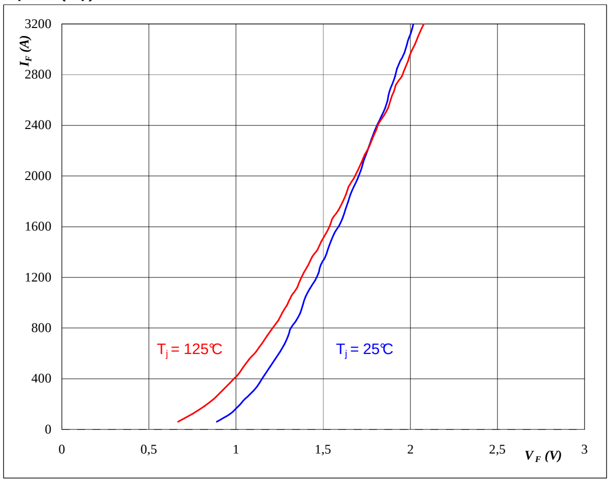
At

t_p =	350	µs
V_{CE} =	10	V

Figure 4 FWD

Typical FWD forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p =	350	µs

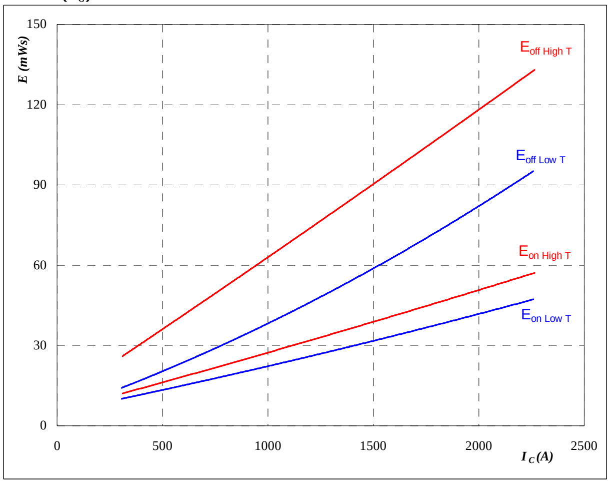
Half Bridge T1, T4 / D5, D6

Half Bridge IGBT and Neutral Point FWD

Figure 5 IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



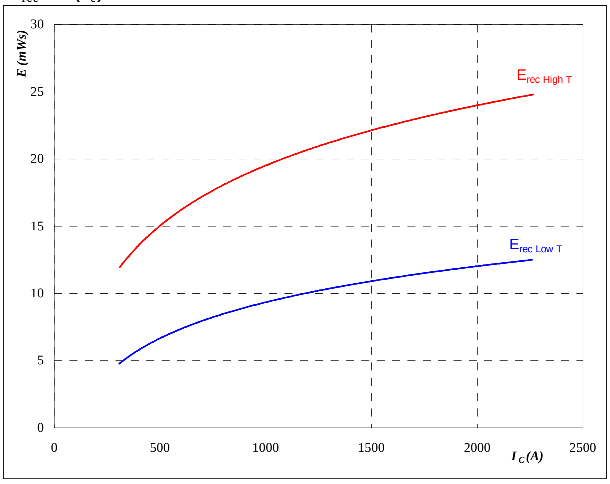
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,5	Ω
R_{goff} =	0,5	Ω

Figure 6 FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_c)$



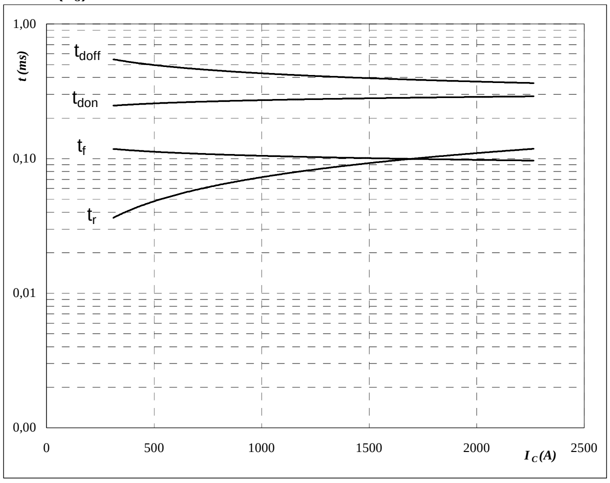
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,5	Ω

Figure 7 IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



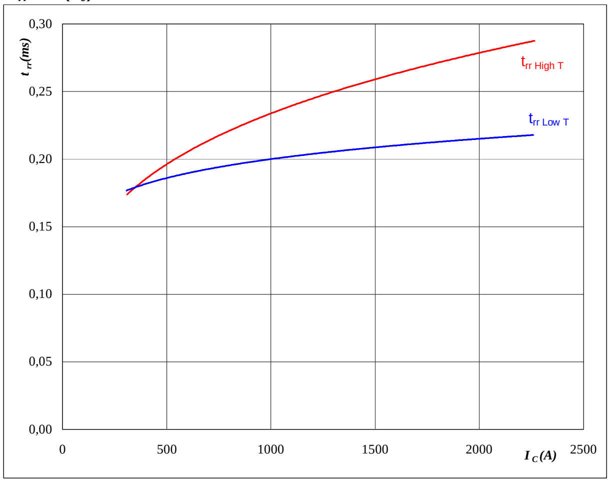
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,5	Ω
R_{goff} =	0,5	Ω

Figure 8 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$



At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,5	Ω

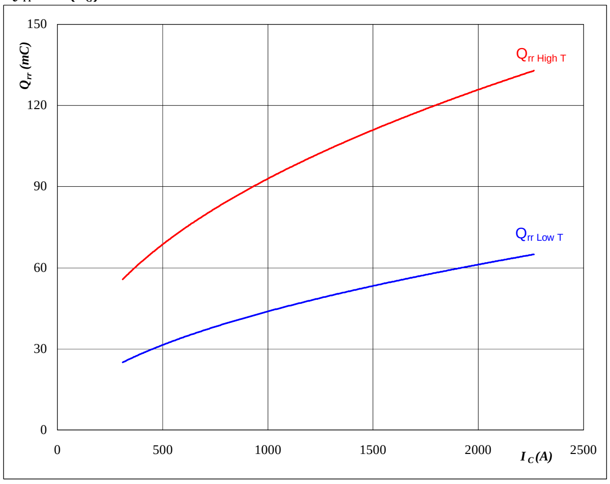
Half Bridge T1, T4 / D5, D6

Half Bridge IGBT and Neutral Point FWD

Figure 9 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



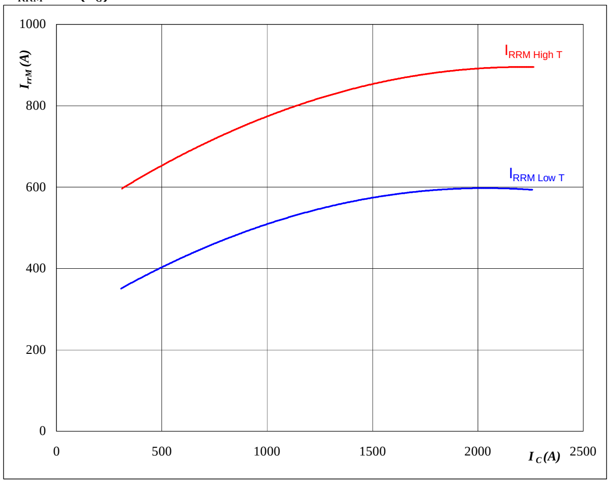
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,50	Ω

Figure 10 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



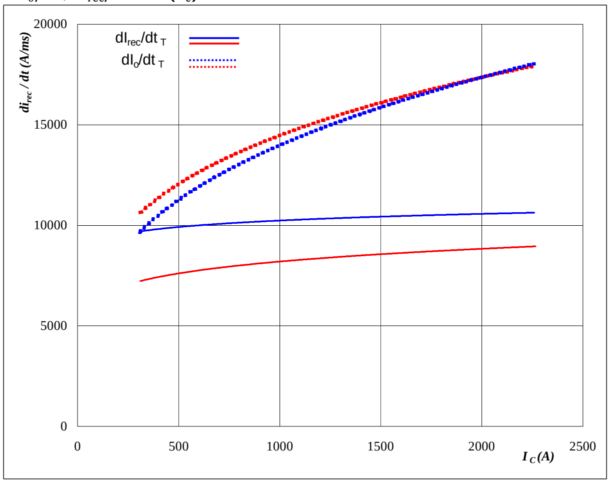
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,50	Ω

Figure 11 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} =	350	V
V_{GE} =	-8 / +15	V
R_{gon} =	0,5	Ω

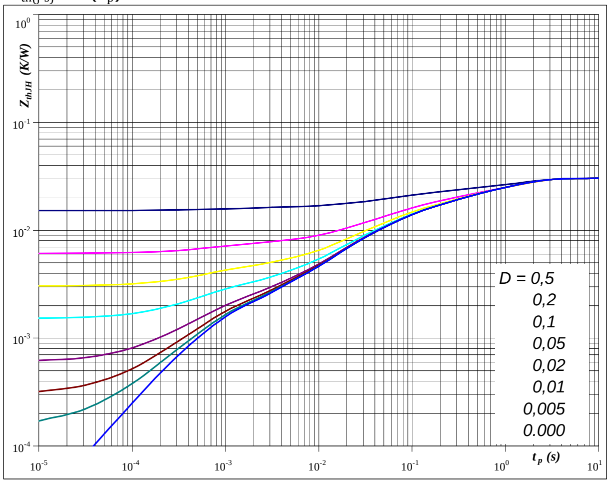
Half Bridge T1, T4 / D5, D6

Half Bridge IGBT and Neutral Point FWD

Figure 12 IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{th(j\text{-}s)} = f(t_p)$



At

$D = t_p / T$

IGBT thermal model values with phase-change material

$R_{th(j\text{-}s)}$ = 0,030 K/W R_{thJC} = 0,024 K/W

IGBT thermal model values

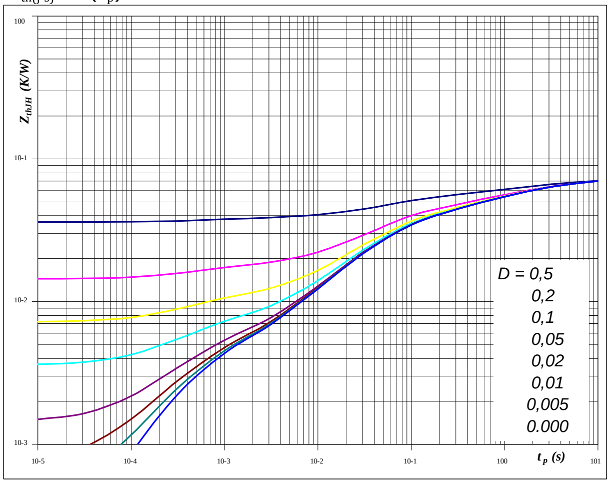
With phase change material

R (K/W)	Tau (s)
0,0127	1,195
0,007	0,185
0,008	0,036
0,001	0,008
0,002	0,001

Figure 13 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{th(j\text{-}s)} = f(t_p)$



At

$D = t_p / T$

FWD thermal model values with phase-change material

$R_{th(j\text{-}s)}$ = 0,072 K/W R_{thJC} = 0,056 K/W

FWD thermal model values

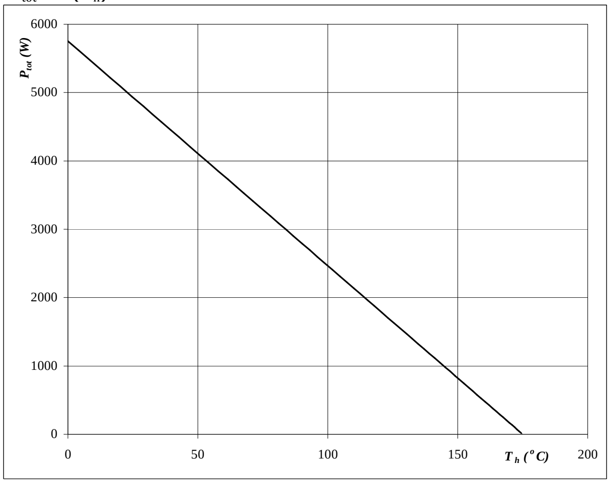
With phase change material

R (K/W)	Tau (s)
0,013	5,38
0,015	1,123
0,011	0,259
0,020	0,050
0,007	0,017
0,002	0,003
0,003	0,0004

Figure 14 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



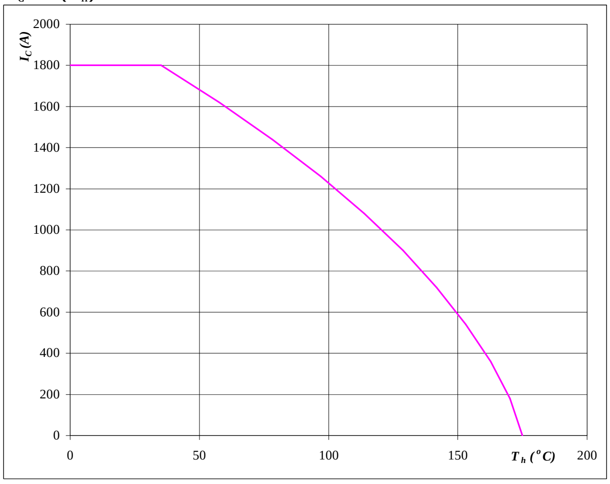
At

T_j = 175 °C

Figure 15 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

T_j = 175 °C

V_{GE} = 15 V

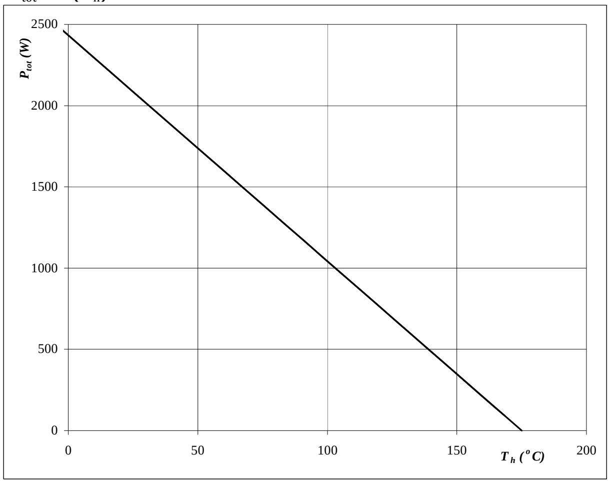
Half Bridge T1, T4 / D5, D6

Half Bridge IGBT and Neutral Point FWD

Figure 16 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



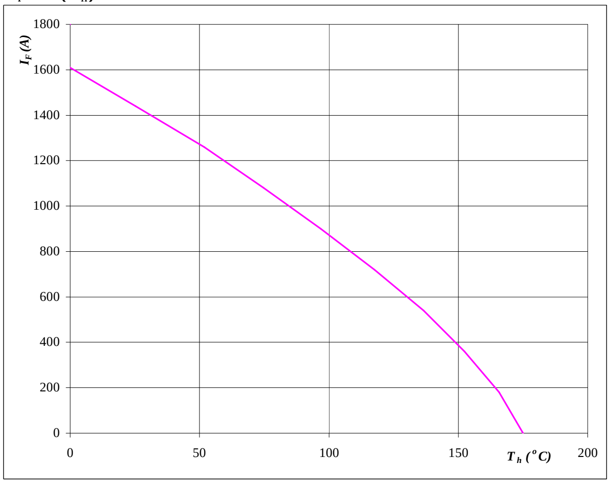
At

T_j = 175 °C

Figure 17 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



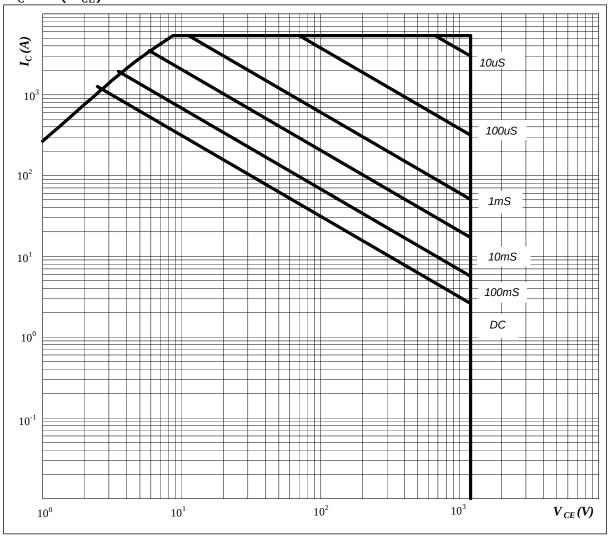
At

T_j = 175 °C

Figure 18 IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



At

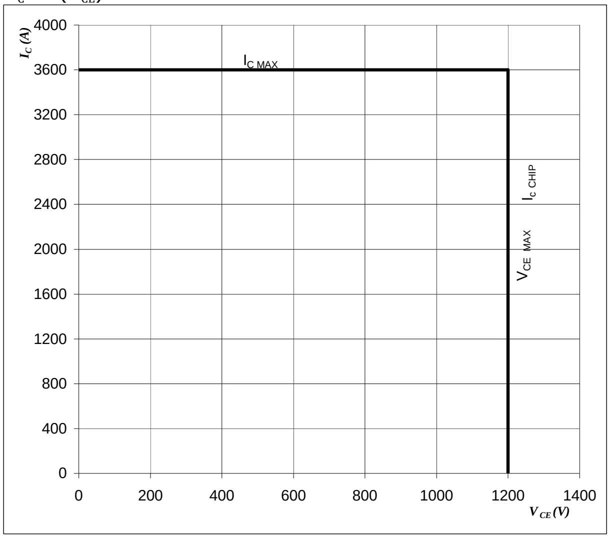
D = single pulse V_{GE} = 15 V

T_h = 80 ºC T_j = T_{jmax} ºC

Figure 19 IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

$U_{ccminus} = U_{ccplus}$

Switching mode : 3 level switching

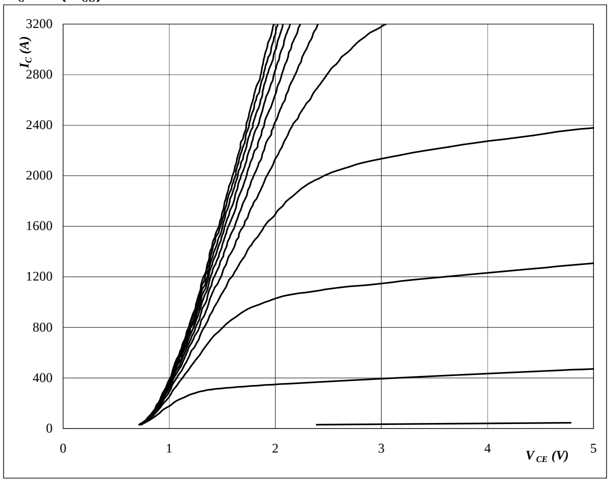
Neutral Point T2, T3 / D2, D3

Neutral Point IGBT and Half Bridge FWD

Figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 350 µs

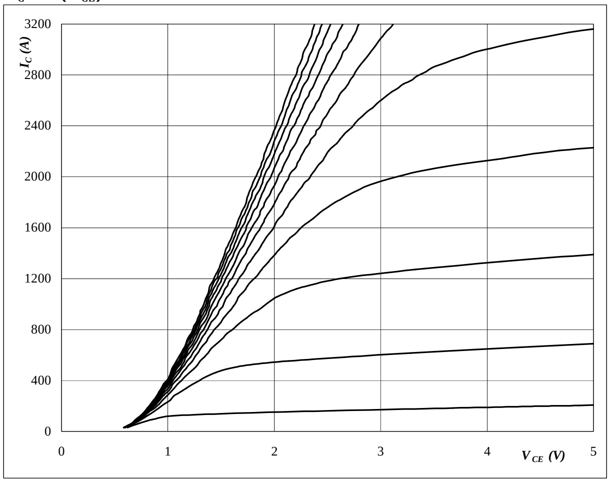
T_j = 25 °C

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 = 350 µs

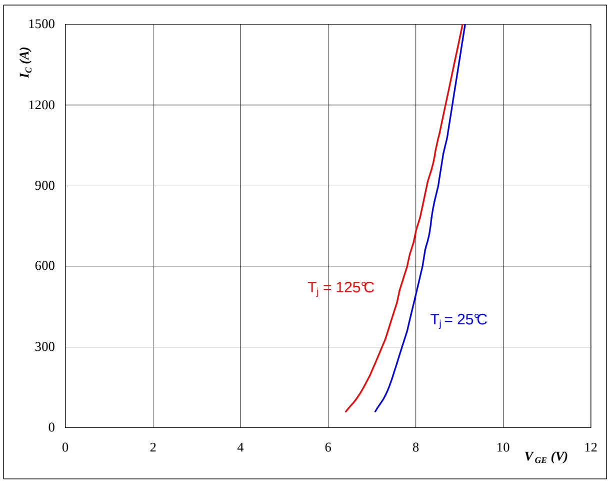
T_j = 125 °C

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

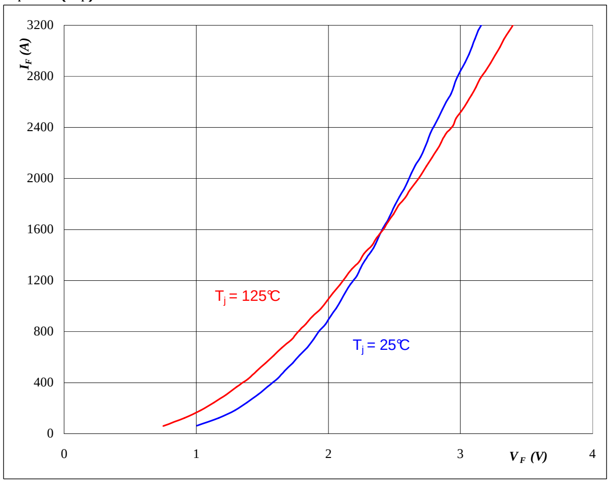
t_p = 350 µs

V_{CE} = 10 V

Figure 4 FWD

Typical FWD forward current as a function of forward voltage

$I_F = f(V_F)$



At

t_p = 350 µs

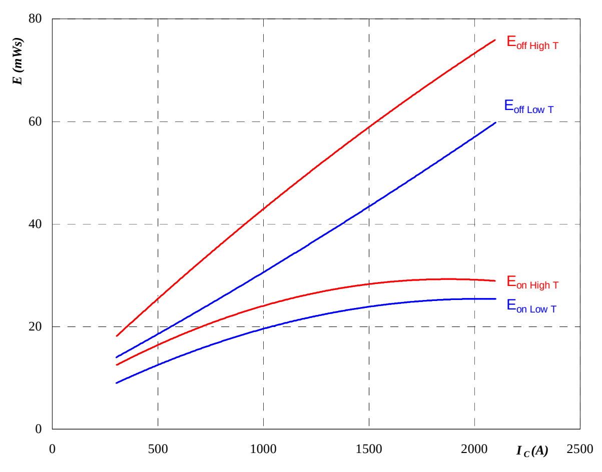
Neutral Point T2, T3 / D2, D3

Neutral Point IGBT and Half Bridge FWD

Figure 5 IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



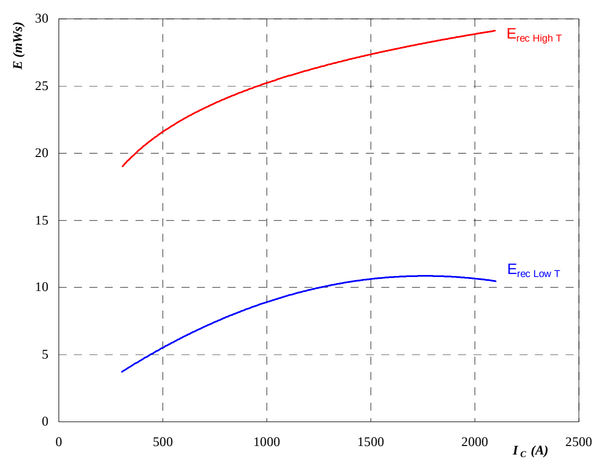
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω
R_{goff} =	0,5	Ω

Figure 6 FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_c)$



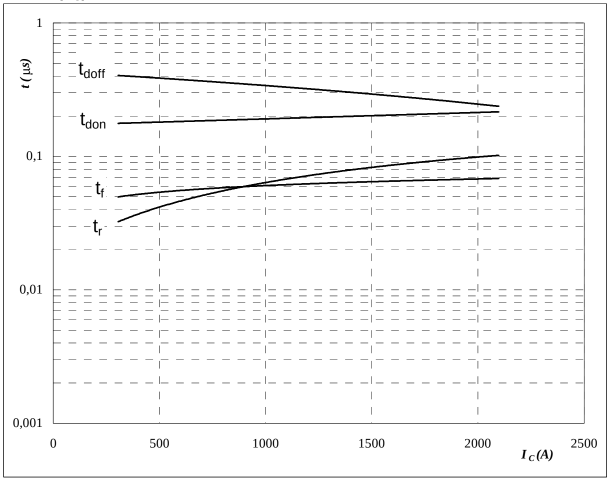
With an inductive load at

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω

Figure 7 IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



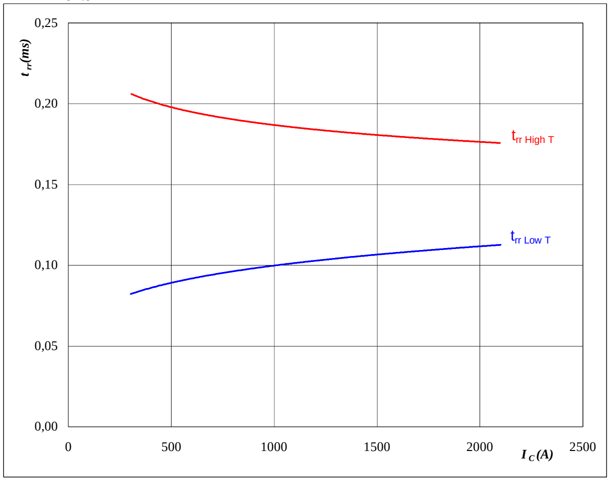
With an inductive load at

T_j =	125	°C	R_{gon} =	0,5	Ω
V_{CE} =	350	V	R_{goff} =	0,5	Ω
V_{GE} =	+15/-8	V			

Figure 8 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$



At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω

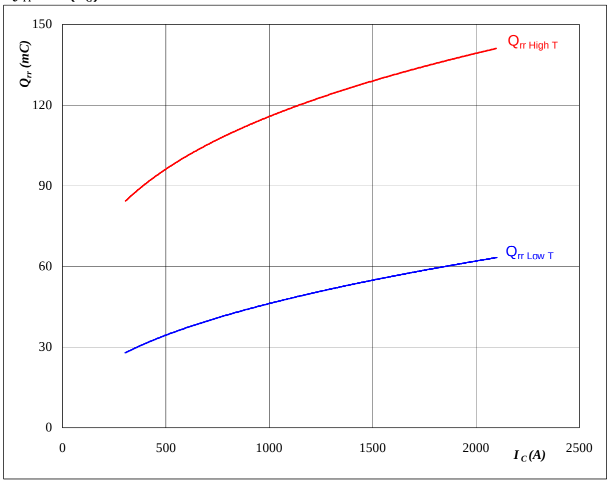
Neutral Point T2, T3 / D2, D3

Neutral Point IGBT and Half Bridge FWD

Figure 9 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



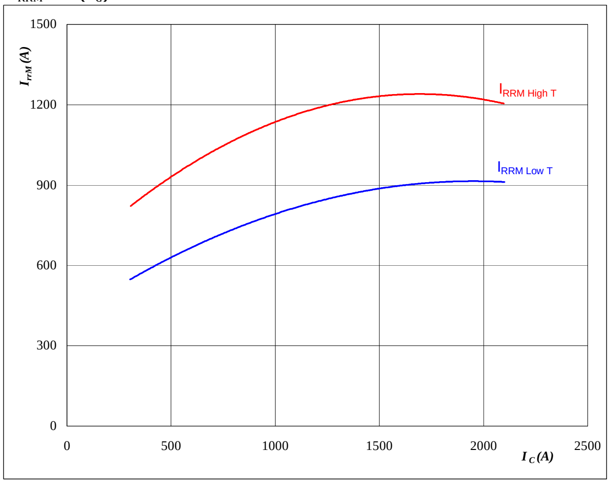
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω

Figure 10 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



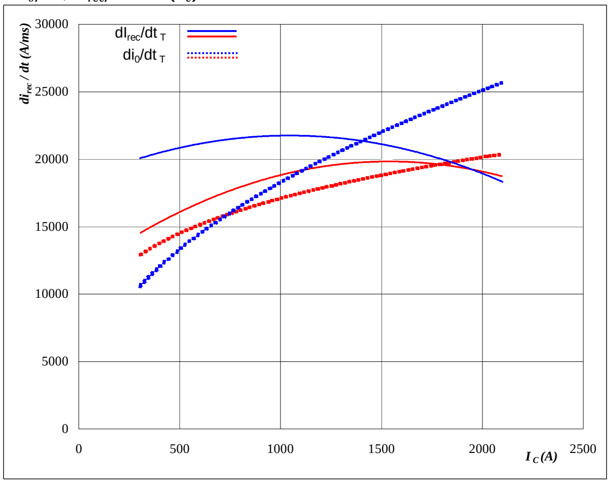
At

T_j =	25/125	°C
V_{CE} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω

Figure 11 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} =	350	V
V_{GE} =	+15/-8	V
R_{gon} =	0,5	Ω

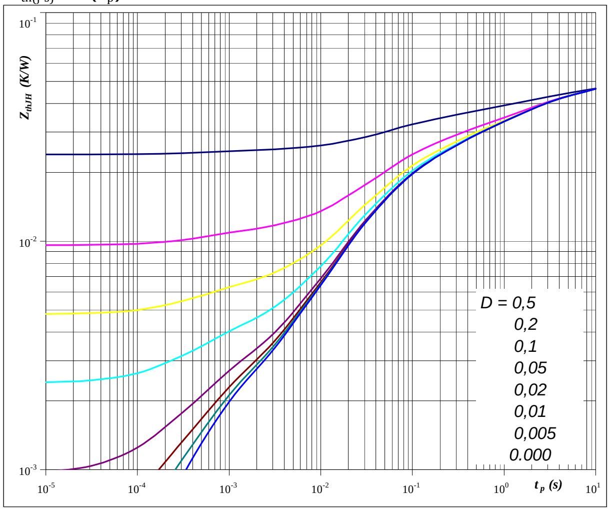
Neutral Point T2, T3 / D2, D3

Neutral Point IGBT and Half Bridge FWD

Figure 12 IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



At

$D = t_p / T$

IGBT thermal model values with phase-change material

$R_{th(j-s)} =$ 0,048 K/W $R_{thJC} =$ 0,037 K/W

IGBT thermal model values

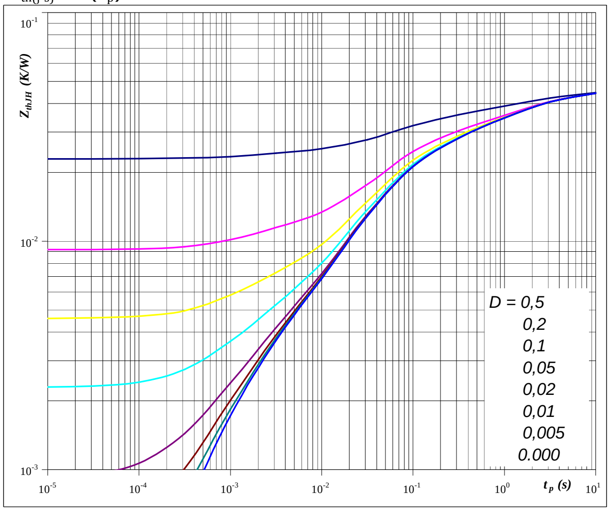
With phase-change material

R (K/W)	Tau (s)
0,014	4,40
0,008	1,10
0,008	0,24
0,011	0,050
0,004	0,017
0,001	0,003
0,001	0,0005

Figure 13 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



At

$D = t_p / T$

FWD thermal model values with phase-change material

$R_{th(j-s)} =$ 0,046 K/W $R_{thJC} =$ 0,036 K/W

FWD thermal model values

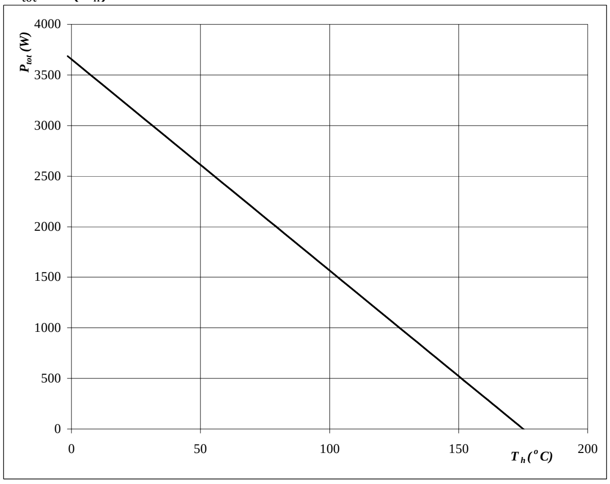
With phase-change material

R (K/W)	Tau (s)
0,007	5,78
0,011	1,38
0,009	0,26
0,014	0,05
0,003	0,02
0,002	0,002

Figure 14 IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



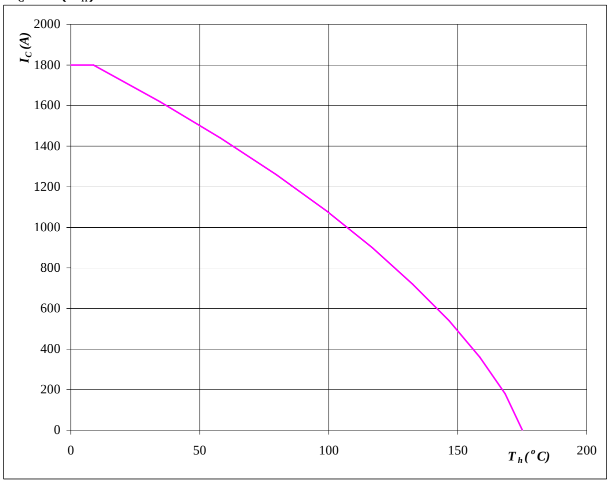
At

$T_j =$ 175 ºC

Figure 15 IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

$T_j =$ 175 ºC

$V_{GE} =$ 15 V

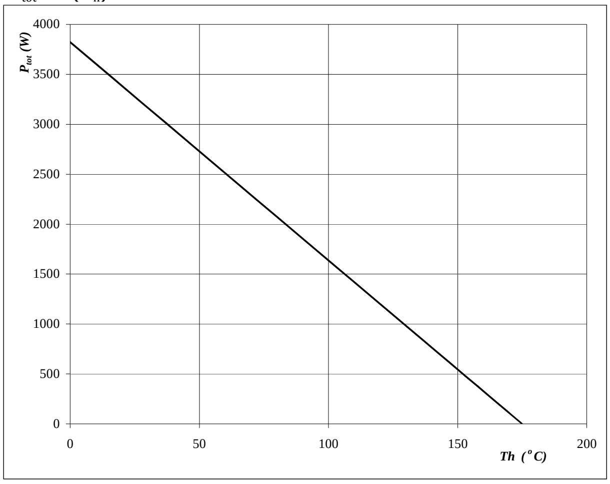
Neutral Point T2, T3 / D2, D3

Neutral Point IGBT and Half Bridge FWD

Figure 16 FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



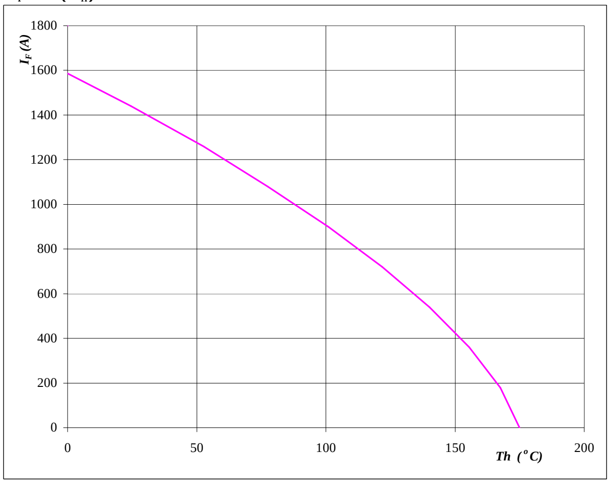
At

T_j = 175 ºC

Figure 17 FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



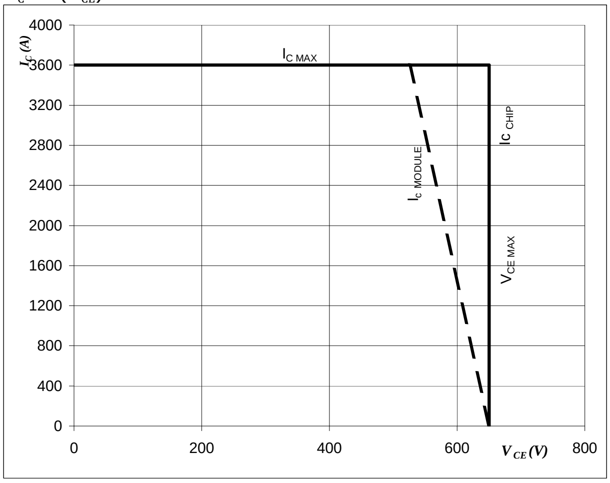
At

T_j = 175 ºC

Figure 18 IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

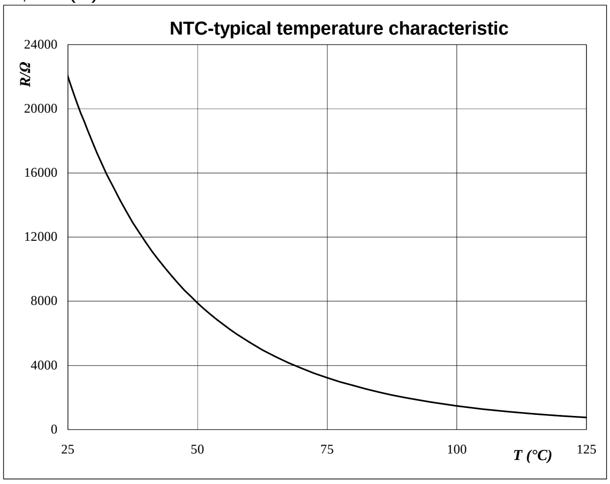
$U_{ccminus}$=U_{ccplus}

Switching mode : 3 level switching

Thermistor

Figure 1	Thermistor

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



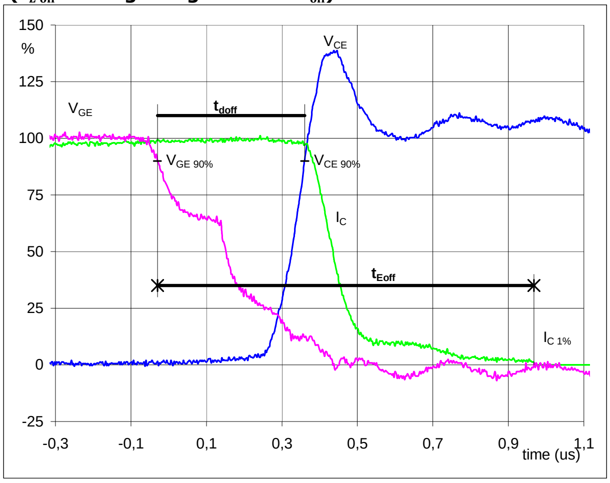
Switching Definitions Half Bridge

General conditions

T_j	=	125 °C
R_{gon}	=	0,5 Ω
R_{goff}	=	0,5 Ω

Figure 1 Half Bridge IGBT

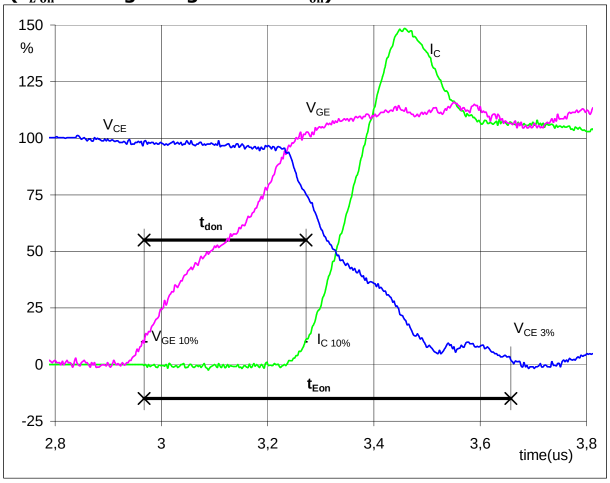
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-10	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	1816	A
t_{doff} =	0,37	μs
$t_{E\,off}$ =	1,00	μs

Figure 2 Half Bridge IGBT

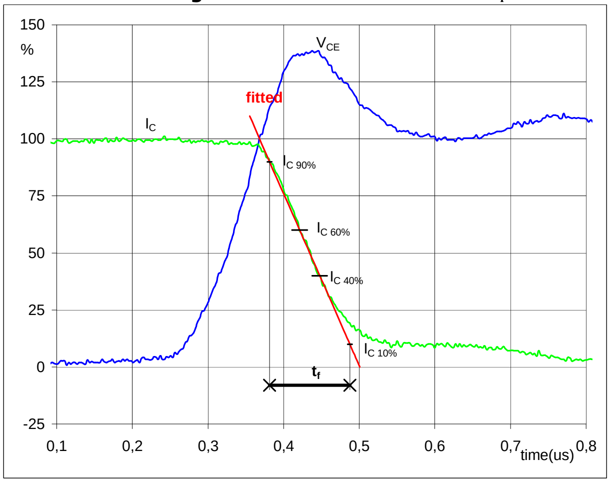
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-10	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	1816	A
t_{don} =	0,28	μs
$t_{E\,on}$ =	0,69	μs

Figure 3 Half Bridge IGBT

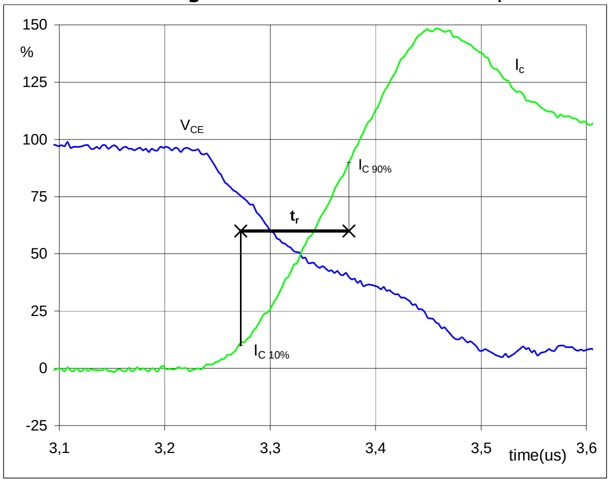
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	1816	A
t_f =	0,10	μs

Figure 4 Half Bridge IGBT

Turn-on Switching Waveforms & definition of t_r

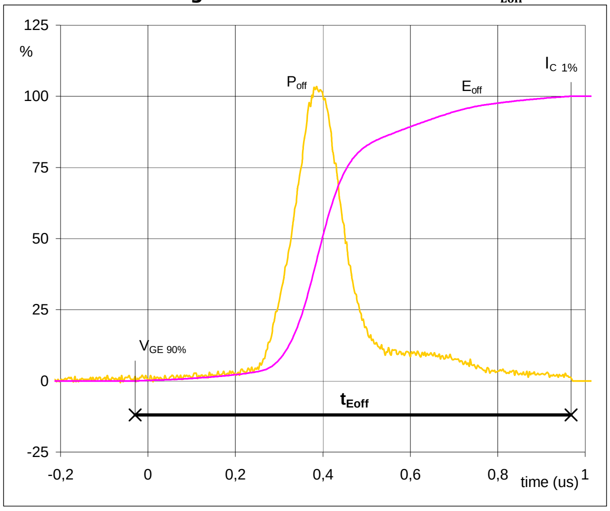


V_C (100%) =	350	V
I_C (100%) =	1816	A
t_r =	0,11	μs

Switching Definitions Half Bridge

Figure 5 Half Bridge IGBT

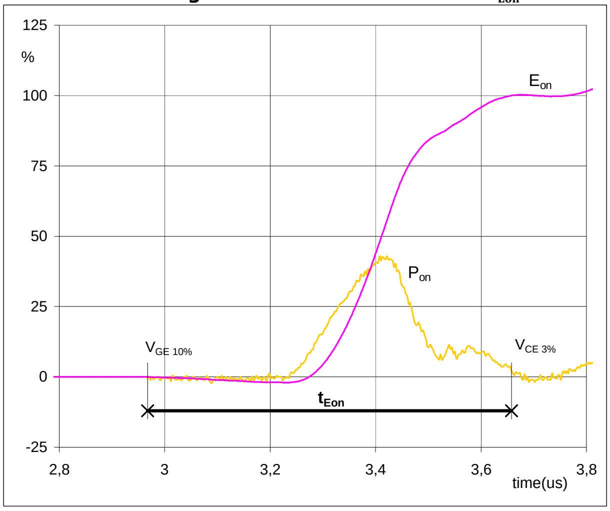
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	635,53	kW
E_{off} (100%) =	107,89	mJ
$t_{E\,off}$ =	1,00	μs

Figure 6 Half Bridge IGBT

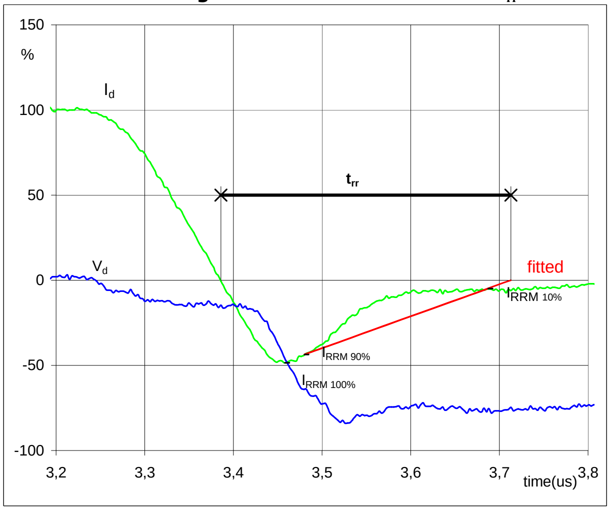
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	635,53	kW
E_{on} (100%) =	48,01	mJ
$t_{E\,on}$ =	0,69	μs

Figure 7 Buck FWD

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

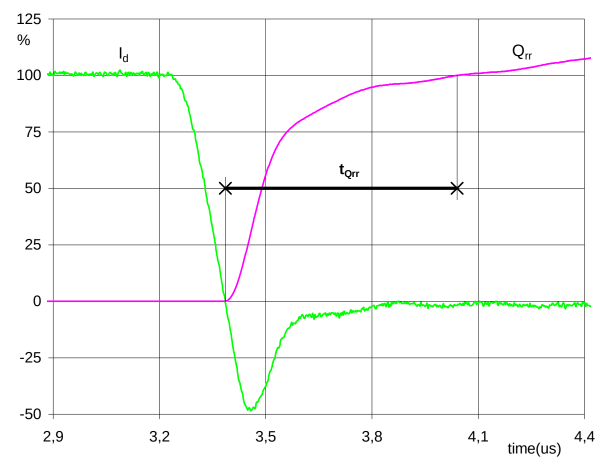


V_d (100%) =	350	V
I_d (100%) =	1816	A
I_{RRM} (100%) =	-883	A
t_{rr} =	0,30	μs

Switching Definitions Half Bridge

Figure 8 Buck FWD

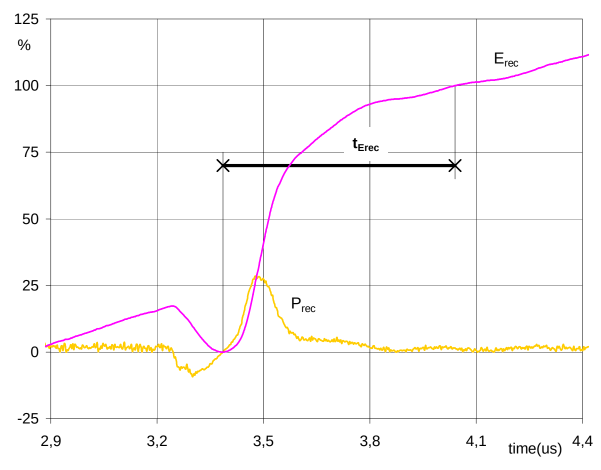
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	1816	A
Q_{rr} (100%) =	124,39	µC
$t_{Q\,rr}$ =	0,65	µs

Figure 9 Buck FWD

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



P_{rec} (100%) =	635,53	kW
E_{rec} (100%) =	24,83	mJ
$t_{E\,rec}$ =	0,65	µs

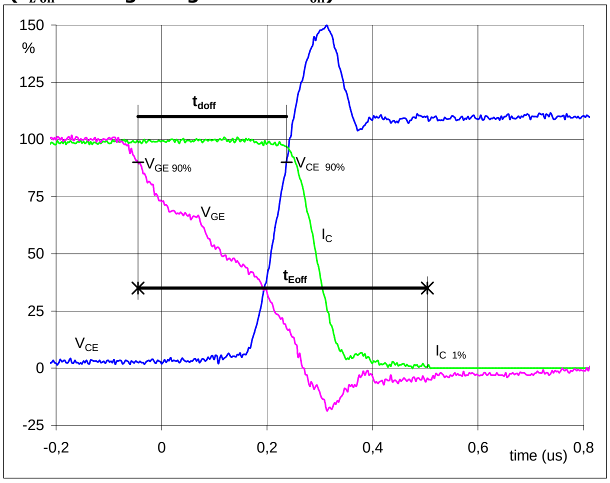
Switching Definitions Neutral Point

General conditions

T_j	=	125 °C
R_{gon}	=	0,5 Ω
R_{goff}	=	0,5 Ω

Figure 1 Neutral Point IGBT

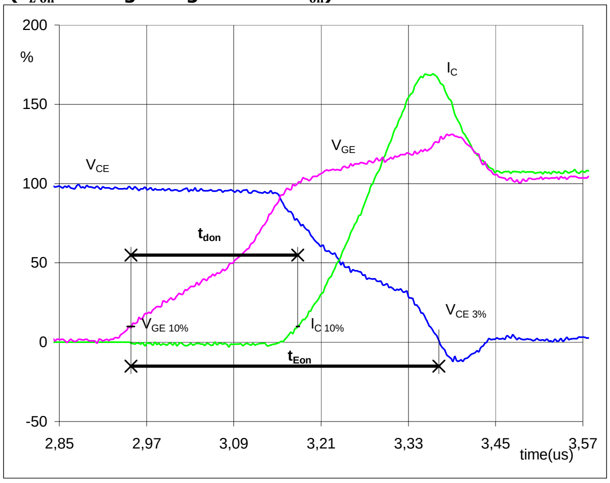
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-8	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	1797	A
t_{doff} =	0,27	µs
$t_{E\,off}$ =	0,55	µs

Figure 2 Neutral Point IGBT

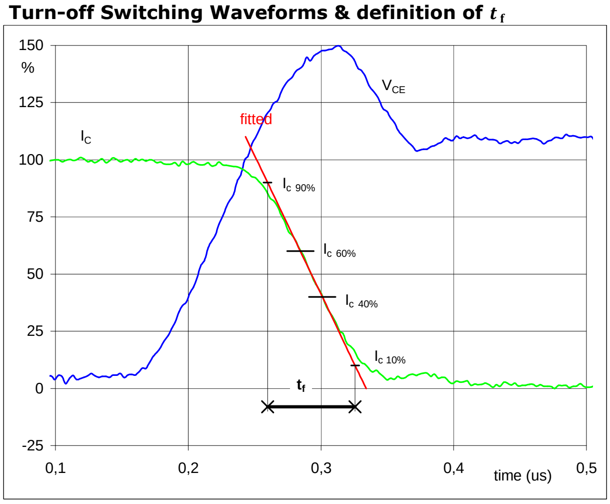
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-8	V
V_{GE} (100%) =	15	V
V_C (100%) =	350	V
I_C (100%) =	1797	A
t_{don} =	0,20	µs
$t_{E\,on}$ =	0,42	µs

Figure 3 Neutral Point IGBT

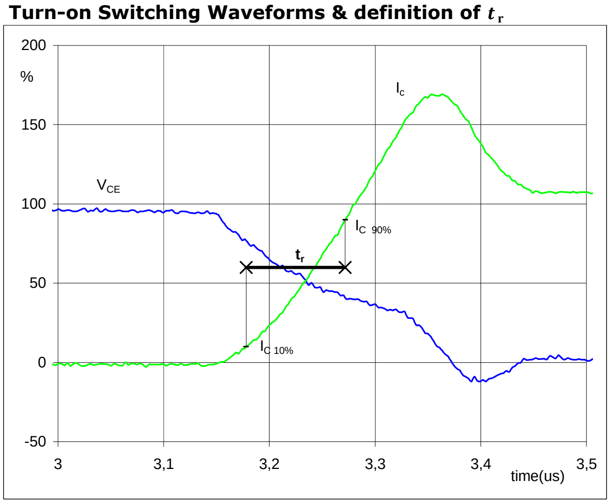
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	350	V
I_C (100%) =	1797	A
t_f =	0,065	µs

Figure 4 Neutral Point IGBT

Turn-on Switching Waveforms & definition of t_r

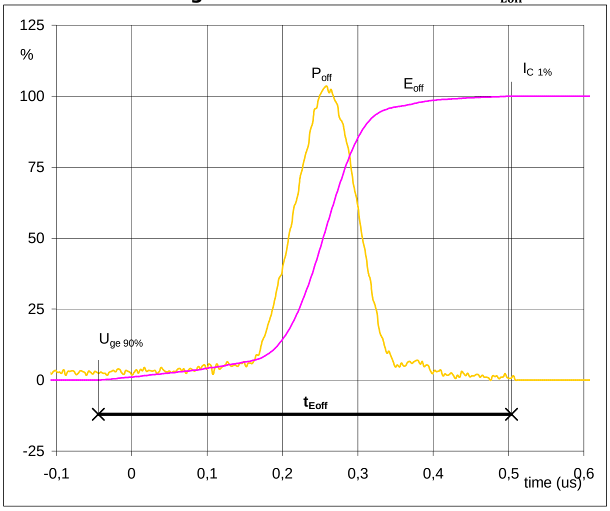


V_C (100%) =	350	V
I_C (100%) =	1797	A
t_r =	0,094	µs

Switching Definitions Neutral Point

Figure 5 Neutral Point IGBT

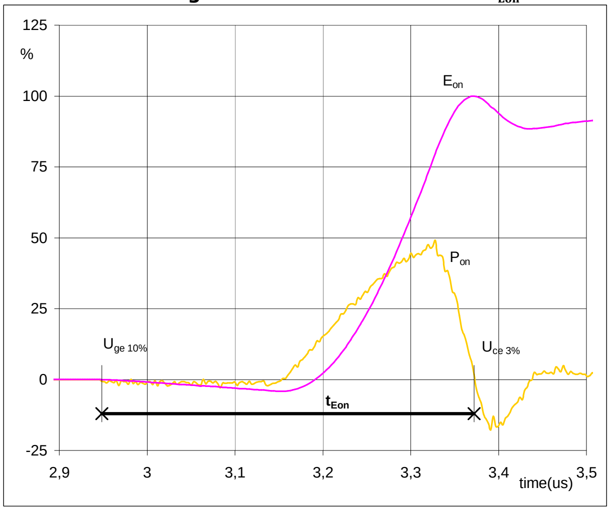
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	629,03	kW
E_{off} (100%) =	71,68	mJ
$t_{E\,off}$ =	0,55	μs

Figure 6 Neutral Point IGBT

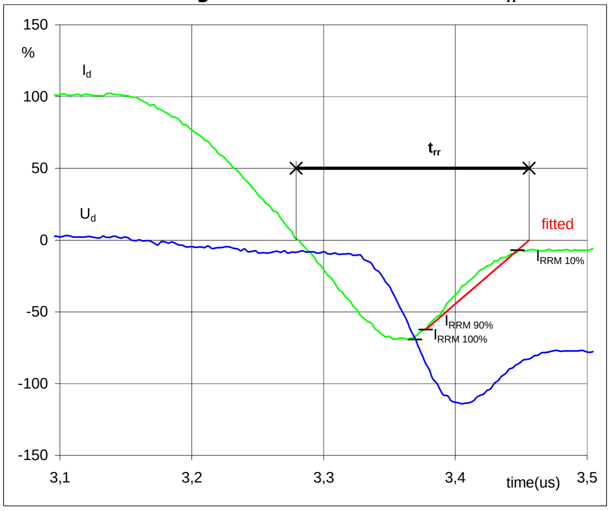
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	629,026	kW
E_{on} (100%) =	33,50	mJ
$t_{E\,on}$ =	0,42	μs

Figure 7 Neutral Point FWD

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

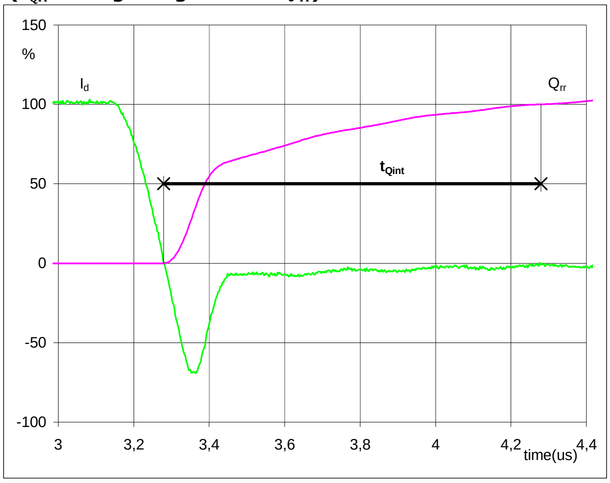


V_d (100%) =	350	V
I_d (100%) =	1797	A
I_{RRM} (100%) =	-1244	A
t_{rr} =	0,18	μs

Switching Definitions Neutral Point

Figure 8 Neutral Point FWD

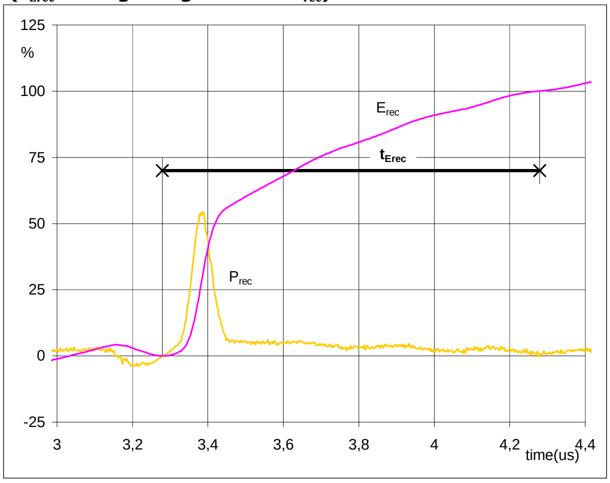
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr}= integrating time for Q_{rr})



I_d (100%) =	1797	A
Q_{rr} (100%) =	165,13	μC
t_{Qint} =	1,00	μs

Figure 9 Neutral Point FWD

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



P_{rec} (100%) =	629,03	kW
E_{rec} (100%) =	35,92	mJ
$t_{E\,rec}$ =	1,00	μs

Outline

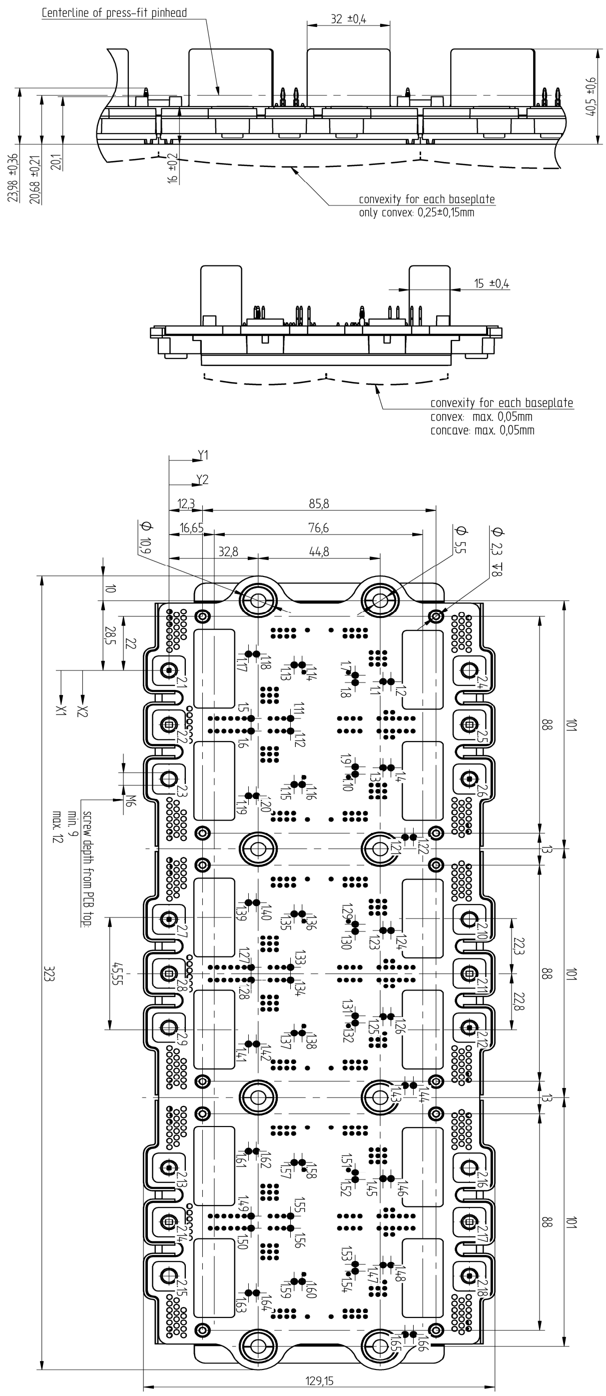
Outline

Driver pins

Pin	X1	Y1	Function	Group
1.1	4,5	78,65	G1-1	T1
1.2	4,5	81,55	E1-1	T1
1.3	39,5	78,65	G1-2	T1
1.4	39,5	81,55	E1-2	T1
1.5	19,45	30,15	DC+ desat	T1
1.6	24,55	30,15	DC+ desat	T1
1.7	1,95	68,4	E2-1	T2
1.8	4,85	68,4	G2-1	T2
1.9	39,15	68,4	G2-2	T2
1.10	42,05	68,4	E2-2	T2
1.11	19,45	44,65	GND desat	T2
1.12	24,55	44,65	GND desat	T2
1.13	-2,2	46	G3-1	T3
1.14	-2,2	48,9	E3-1	T3
1.15	46,2	46	G3-2	T3
1.16	46,2	48,9	E3-2	T3
1.17	-6,75	29,2	E4-1	T4
1.18	-6,75	32,1	G4-1	T4
1.19	50,75	29,2	E4-2	T4
1.20	50,75	32,1	G4-2	T4
1.21	67,65	86,7	Therm12	Rt1
1.22	67,65	89,8	Therm11	Rt1
1.23	105,5	78,65	G1-3	T1
1.24	105,5	81,55	E1-3	T1
1.25	140,5	78,65	G1-4	T1
1.26	140,5	81,55	E1-4	T1
1.27	120,45	30,15	DC+ desat	T1
1.28	125,55	30,15	DC+ desat	T1
1.29	102,95	68,4	E2-3	T2
1.30	105,85	68,4	G2-3	T2
1.31	140,15	68,4	G2-4	T2
1.32	143,05	68,4	E2-4	T2
1.33	120,45	44,65	GND desat	T2
1.34	125,55	44,65	GND desat	T2
1.35	98,8	46	G3-3	T3
1.36	98,8	48,9	E3-3	T3
1.37	147,2	46	G3-4	T3
1.38	147,2	48,9	E3-4	T3
1.39	94,25	29,2	E4-3	T4
1.40	94,25	32,1	G4-3	T4
1.41	151,75	29,2	E4-4	T4
1.42	151,75	32,1	G4-4	T4
1.43	168,65	86,7	Therm22	Rt2
1.44	168,65	89,8	Therm21	Rt2
1.45	206,5	78,65	G1-5	T1
1.46	206,5	81,55	E1-5	T1
1.47	241,5	78,65	G1-6	T1
1.48	241,5	81,55	E1-6	T1
1.49	221,45	30,15	DC+ desat	T1
1.50	226,55	30,15	DC+ desat	T1
1.51	203,95	68,4	E2-5	T2
1.52	206,85	68,4	G2-5	T2
1.53	241,15	68,4	G2-6	T2
1.54	244,05	68,4	E2-6	T2
1.55	221,45	44,65	GND desat	T2
1.56	226,55	44,65	GND desat	T2
1.57	199,8	46	G3-5	T3
1.58	199,8	48,9	E3-5	T3
1.59	248,2	46	G3-6	T3
1.60	248,2	48,9	E3-6	T3
1.61	195,25	29,2	E4-5	T4
1.62	195,25	32,1	G4-5	T4
1.63	252,75	29,2	E4-6	T4
1.64	252,8	32,1	G4-6	T4
1.65	269,7	86,7	Therm32	Rt3
1.66	269,7	89,8	Therm31	Rt3

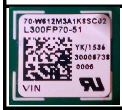
Low current connections

M6 screw	X2	Y2	Function
2.1	0	0	Phase
2.2	22	0	Phase
2.3	44	0	Phase
2.4	0	110,4	DC+
2.5	22	110,4	Neutral
2.6	44	110,4	DC-
2.7	101	0	Phase
2.8	123	0	Phase
2.9	145	0	Phase
2.10	101	110,4	DC+
2.11	123	110,4	Neutral
2.12	145	110,4	DC-
2.13	202	0	Phase
2.14	224	0	Phase
2.15	246	0	Phase
2.16	202	110,4	DC+
2.17	224	110,4	Neutral
2.18	246	110,4	DC-

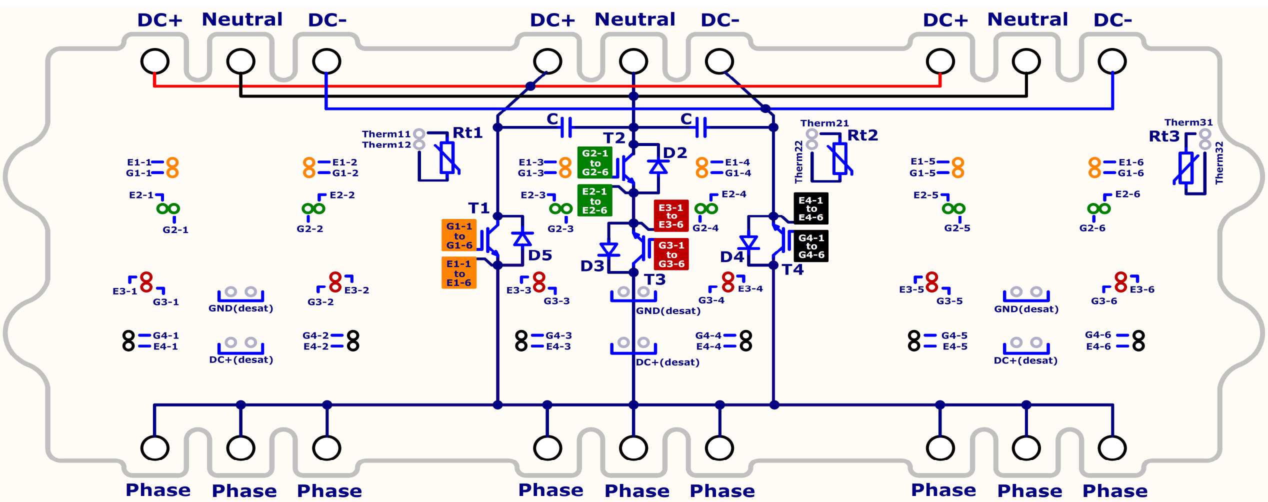


Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

Version		Oredering Code				
Standart		70-W612M3A1K8SC02-L300FP70				
 Date code Lot Serial VIN UL	Text	Name	Date code	UL & Vinco	Lot	Serial
		NN-NNNNNNNNNNNNNN-NNNNNNNN	WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver	Lot number	Serial	Date code	
		TTTT-TTT	LLLLL	SSSS	WWYY	

Pinout



NOTE: Driver pins for parallel devices are not connected inside the module!
Gx-1 to Gx-6 and Ex-1 to Ex-6 shall be connected on customer PCB!
Where x = 1 to 4

Identification

ID	Component	Voltage	Current	Function	Comment
T1, T4	IGBT	1200V	1800A	Half Bridge Switch	
D5, D6	FWD	650V	1800A	Neutral Point Diode	
T2, T3	IGBT	650V	1800A	Neutral Point Switch	
D1, D4	FWD	1200V	1800A	Half Bridge Diode	
Rt1, Rt2, Rt3	NTC	-	-	Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	**5**	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for Widebody 3phase packages see vincotech.com website.

Package data
Package data for Widebody 3phase packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
70-W612M3A1K8SC02-L300FP70-D1-14	09 Marc. 2016		