***flow* PIM 0** | **600 V / 10 A**

Features

- Clip-in housing
- Trenchstop™ IGBT3 for low saturation losses
- Optional w/o BRC

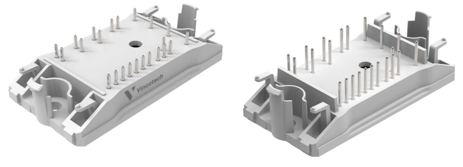
Target Applications

- Industrial drives
- Embedded drives

Types

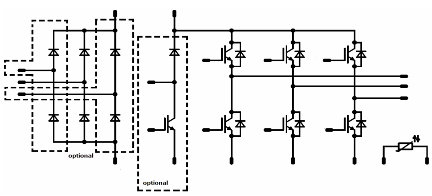
- V23990-P543-A28-PM
- V23990-P543-A29-PM
- V23990-P543-B28-PM
- V23990-P543-B128-PM
- V23990-P543-B129-PM
- V23990-P543-C28-PM
- V23990-P543-C29-PM
- V23990-P543-D28-PM
- V23990-P543-D129-PM

flow 0 housing



12mm housing   17mm housing

Schematic



Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Rectifier Diode				
Repetitive peak reverse voltage	V_{RRM}		1600	V
DC forward current	I_{FAV}	$T_j = T_{jmax}$ T_s = 80 °C T_c = 80 °C	34 42	A
Surge (non-repetitive) forward current	I_{FSM}	t_p = 10 ms 50 Hz half sine wave T_j = 25 °C	200	A
I2t-value	I^2t		200	A^2s
Power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C T_c = 80 °C	43 66	W
Maximum Junction Temperature	T_{jmax}		150	°C
Inverter Switch				
Collector-emitter breakdown voltage	V_{CE}		600	V
DC collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C T_c = 80 °C	14 14	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	30	A
Turn off safe operating area		V_{CE} ≤ 1200 V, T_j ≤ T_{op} max	30	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C T_c = 80 °C	44 66	W
Gate-emitter peak voltage	V_{GE}		±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V	6 360	μs V
Maximum Junction Temperature	T_{jmax}		175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	14 14	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		20	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	21 29	W
Maximum Junction Temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter breakdown voltage	V_{CE}			600	V
DC collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	8 8	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		18	A
Turn off safe operating area		V_{CE} ≤ 1200 V, T_j ≤ T_{op} max		18	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	36 54	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		6 360	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Brake Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			600	V
DC forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	8 8	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		12	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C T_c = 80 °C	27 40	W
Maximum Junction Temperature	T_{jmax}			175	°C
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{is}	t = 2 s	DC voltage	4000	V
Creepage distance				min 12,7	mm
Clearance			12 mm housing	9,29	mm
			17 mm housing	min 12,7	mm
Comparative tracking index	CTI			>200	

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	
Rectifier Diode										
Forward voltage	V_F				30	25 125	0,8	1,26 1,24	1,45	V
Threshold voltage (for power loss calc. only)	V_{to}				30	25 125		0,92 0,82		V
Slope resistance (for power loss calc. only)	r_t				30	25 125		11 14		mΩ
Reverse current	I_r			1500		145			1,1	mA
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,61		K/W
Inverter Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00015	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		10	25 125	1	1,59 1,78	2,2	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		25			0,08	mA
Gate-emitter leakage current	I_{GES}		20	0		25			350	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 32 Ω	±15	300	10	25 125		15 14		ns
Rise time	t_r					25 125		11 14		ns
Turn-off delay time	$t_{d(off)}$					25 125		155 170		ns
Fall time	t_f					25 125		89 98		ns
Turn-on energy loss	E_{on}					25 125		0,16 0,22		mWs
Turn-off energy loss	E_{off}					25 125		0,24 0,29		mWs
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		551		pF
Output capacitance	C_{oss}							40		pF
Reverse transfer capacitance	C_{rss}							17		pF
Gate charge	Q_G		±15	480	10	25		62		nC
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,15		K/W
Inverter Diode										
Diode forward voltage	V_F				10	25 125	1	1,61 1,51	2,25	V
Peak reverse recovery current	I_{RRM}	R_{gon} = 32 Ω	±15	300	10	25 125		10 11		A
Reverse recovery time	t_{rr}					25 125		142 219		ns
Reverse recovered charge	Q_{rr}					25 125		0,46 0,80		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		703 397		A/μs
Reverse recovered energy	E_{rec}					25 125		0,09 0,17		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,98		K/W

Characteristic Values

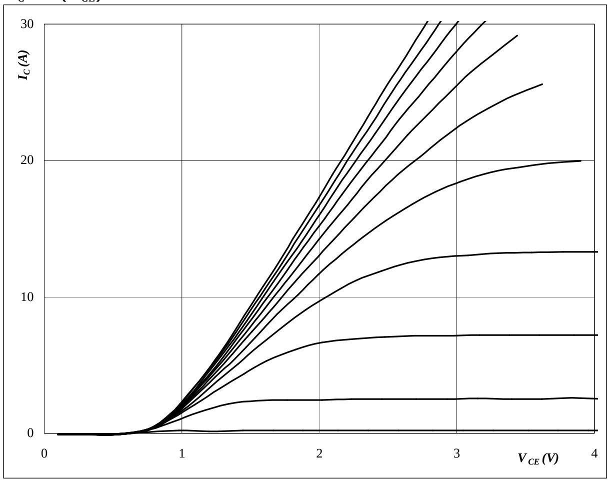
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	
Brake Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00043	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		6	25 125	1	1,55 1,72	2,1	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		25			0,06	mA
Gate-emitter leakage current	I_{GES}		20	0		25			350	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 32 Ω	±15	300	6	25 125		11 10		ns
Rise time	t_r					25 125		8 10		
Turn-off delay time	$t_{d(off)}$					25 125		118 130		
Fall time	t_f					25 125		93 117		
Turn-on energy loss	E_{on}					25 125		0,07 0,10		mWs
Turn-off energy loss	E_{off}					25 125		0,15 0,18		
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		368		pF
Output capacitance	C_{oss}							28		
Reverse transfer capacitance	C_{rss}							11		
Gate charge	Q_G					25		42		nC
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,44		K/W
Brake Diode										
Diode forward voltage	V_F				6	25 125	1	1,69 1,61	2,5	V
Reverse leakage current	I_r			600		25			60	µA
Peak reverse recovery current	I_{RRM}	R_{gon} = 32 Ω	±15	300	6	25 125		7 8		A
Reverse recovery time	t_{rr}					25 125		97 151		ns
Reverse recovered charge	Q_{rr}					25 125		0,23 0,23		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		522 321		A/µs
Reverse recovery energy	E_{rec}					25 125		0,05 0,09		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,68		K/W
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-5		5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	$B_{(25/50)}$	Tol. ± 3 %				25				K
B-value	$B_{(25/100)}$	Tol. ± 3 %				25		4000		K
Vincotech NTC Reference						25			A	

Inverter Characteristics

Figure 1	Inverter IGBT

Typical output characteristics

$I_C = f(V_{CE})$



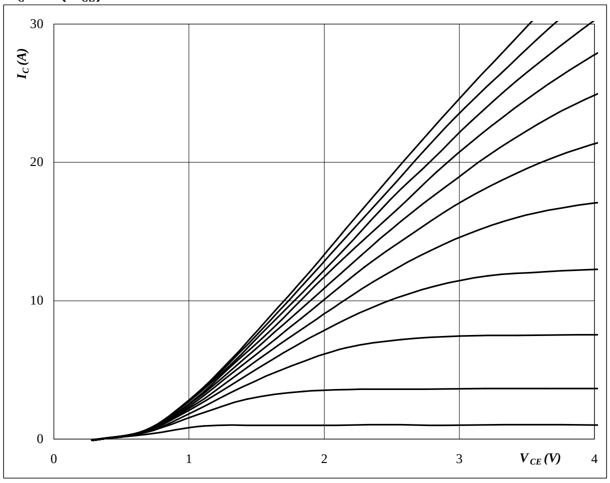
At

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

Figure 2	Inverter IGBT

Typical output characteristics

$I_C = f(V_{CE})$



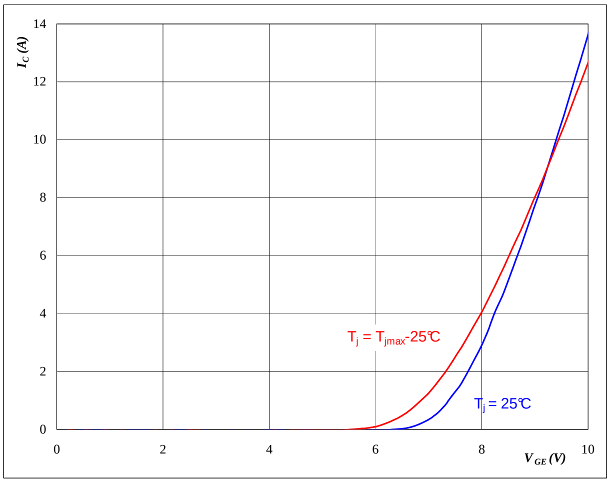
At

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

Figure 3	Inverter IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



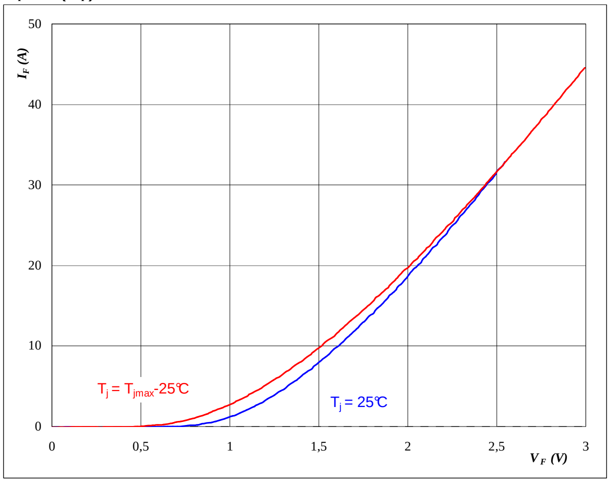
At

t_p =	250	μs
V_{CE} =	10	V

Figure 4	Inverter FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

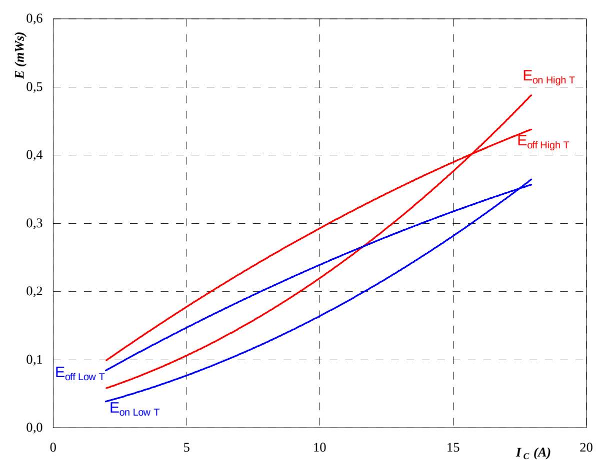
t_p =	250	μs

Inverter Characteristics

Figure 5	Inverter IGBT

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



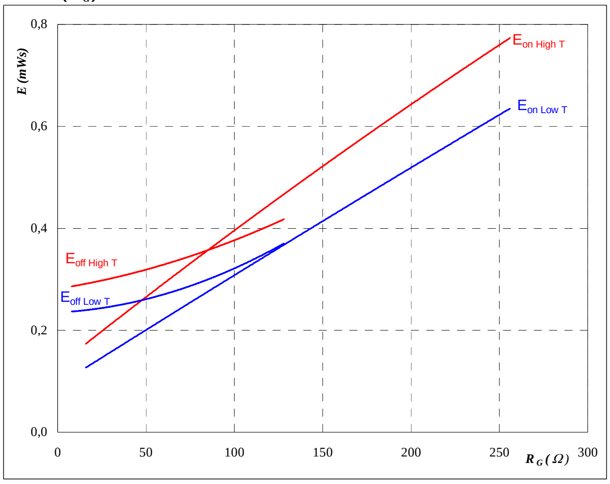
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω
R_{goff} =	16	Ω

Figure 6	Inverter IGBT

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



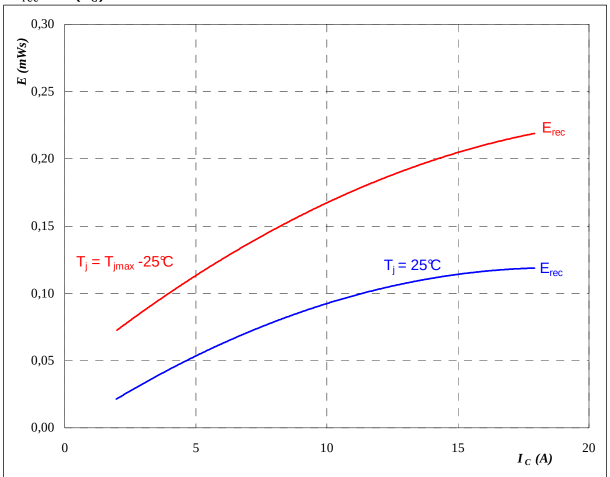
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	10	A

Figure 7	Inverter FWD

Typical reverse recovery energy loss
as a function of collector current

$E_{rec} = f(I_C)$



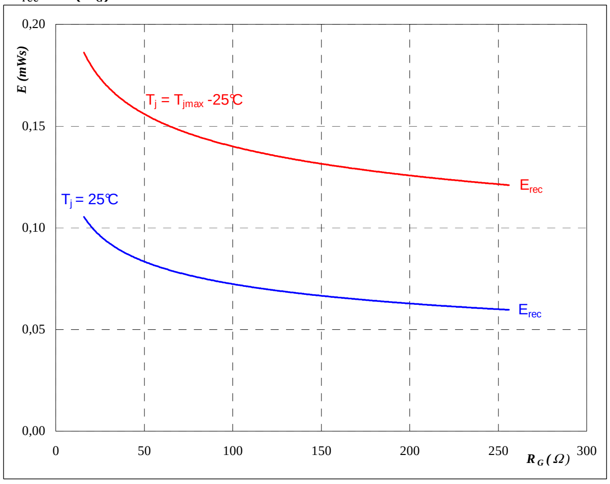
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 8	Inverter FWD

Typical reverse recovery energy loss
as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

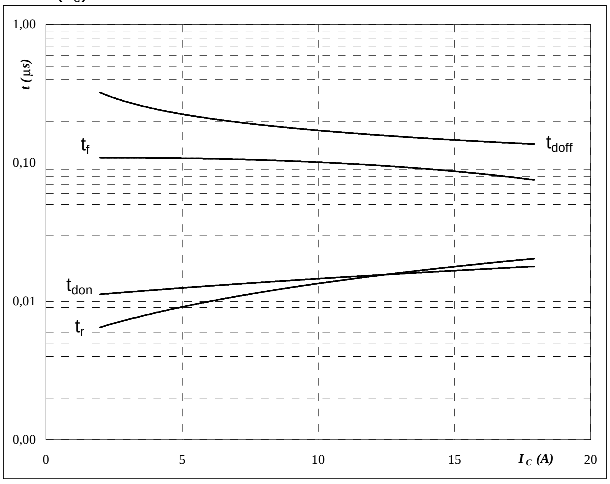
T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	10	A

Inverter Characteristics

Figure 9 Inverter IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



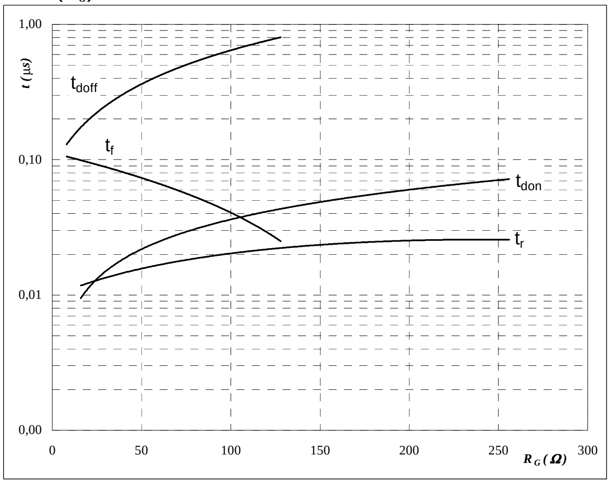
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω
R_{goff} =	16	Ω

Figure 10 Inverter IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



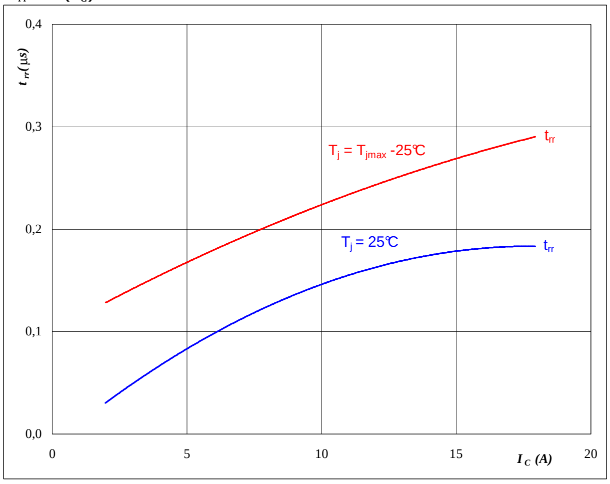
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	10	A

Figure 11 Inverter FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



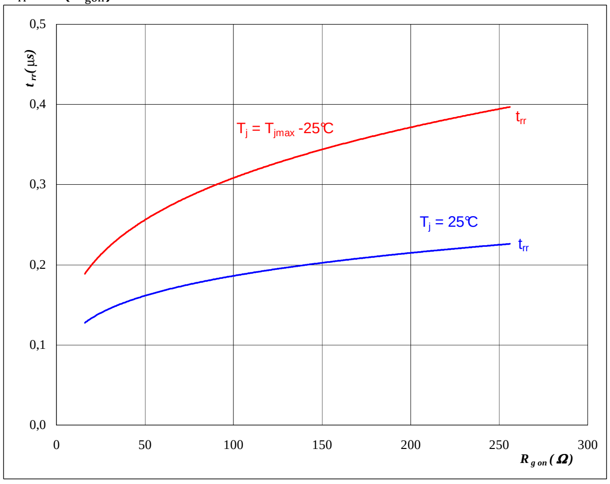
At

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 12 Inverter FWD

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

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



At

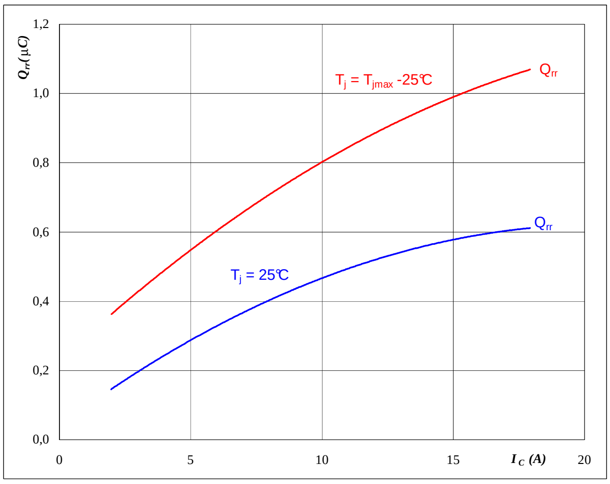
T_j =	25/125	°C
V_R =	300	V
I_F =	10	A
V_{GE} =	15	V

Inverter Characteristics

Figure 13 Inverter FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



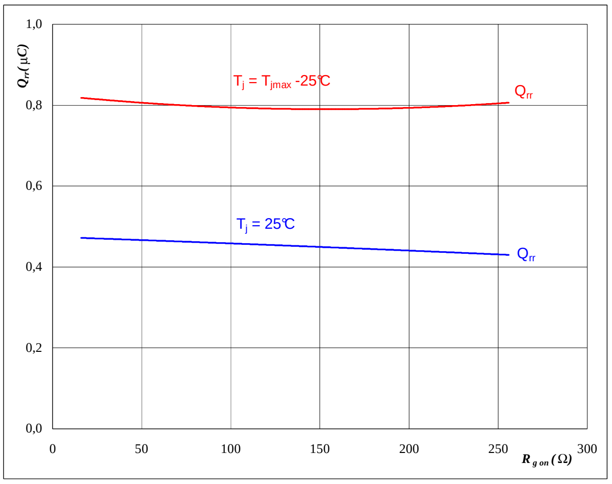
At

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 14 Inverter FWD

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

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



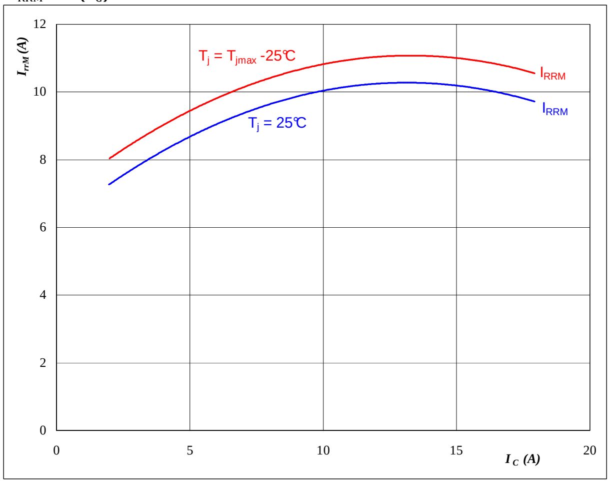
At

T_j =	25/125	°C
V_R =	300	V
I_F =	10	A
V_{GE} =	15	V

Figure 15 Inverter FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



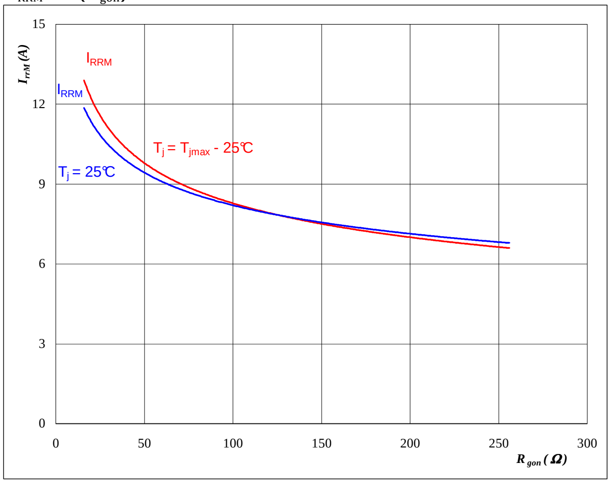
At

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 16 Inverter FWD

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

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



At

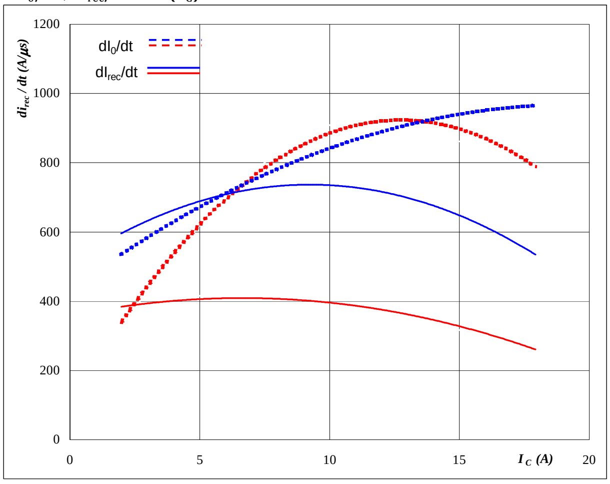
T_j =	25/125	°C
V_R =	300	V
I_F =	10	A
V_{GE} =	15	V

Inverter Characteristics

Figure 17 Inverter FWD

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

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



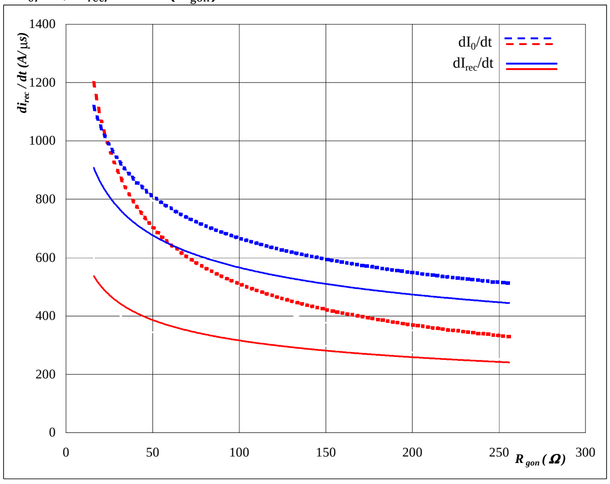
At

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 18 Inverter FWD

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

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



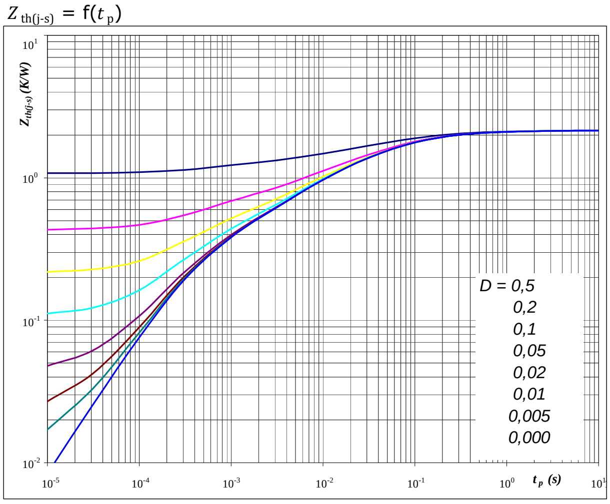
At

T_j =	25/125	°C
V_R =	300	V
I_F =	10	A
V_{GE} =	15	V

Figure 19 Inverter IGBT

IGBT transient thermal impedance as a function of pulse width

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



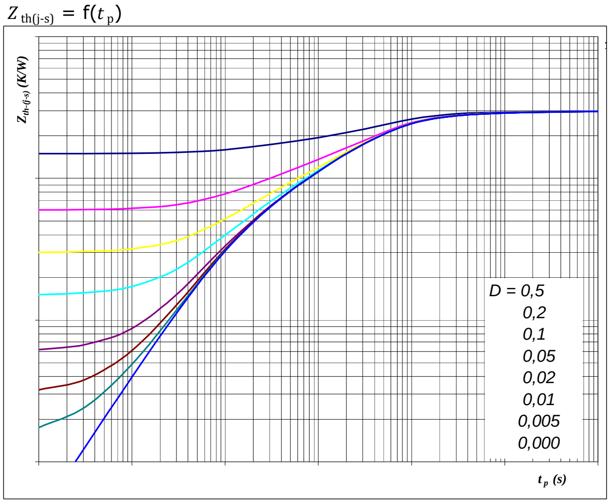
At

D =	t_p / T	
$R_{th(j-s)}$ =	2,15	K/W

Figure 20 Inverter FWD

FWD transient thermal impedance as a function of pulse width

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



At

D =	t_p / T	
$R_{th(j-s)}$ =	2,98	K/W

IGBT thermal model values

R (K/W)	Tau (s)
1,04E-01	5,21E+00
2,88E-01	5,04E-01
6,99E-01	1,01E-01
4,91E-01	1,86E-02
3,07E-01	3,43E-03
2,60E-01	3,51E-04

FWD thermal model values

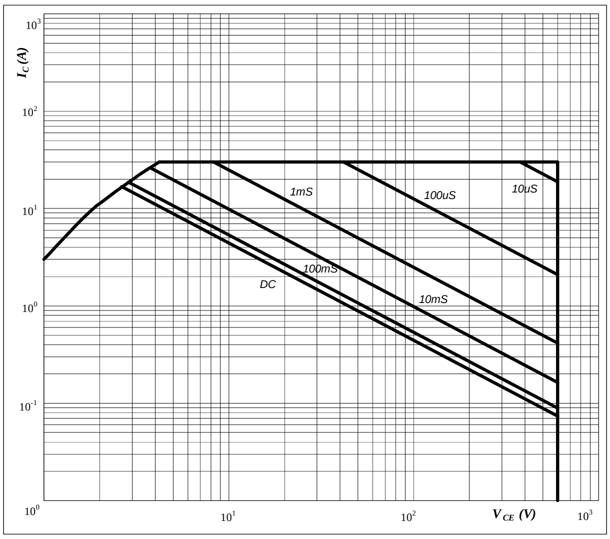
R (K/W)	Tau (s)
8,74E-02	8,15E+00
2,41E-01	5,25E-01
1,22E+00	9,35E-02
6,89E-01	2,02E-02
4,52E-01	3,19E-03
2,99E-01	4,10E-04

Inverter Characteristics

Figure 25 Inverter IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



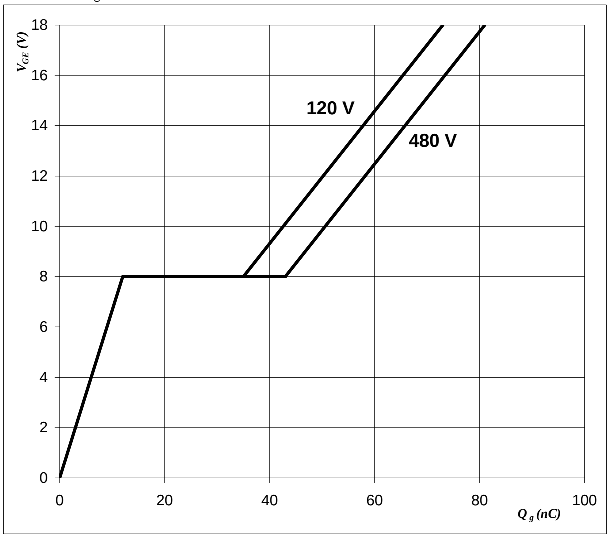
At

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

Figure 26 Inverter IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



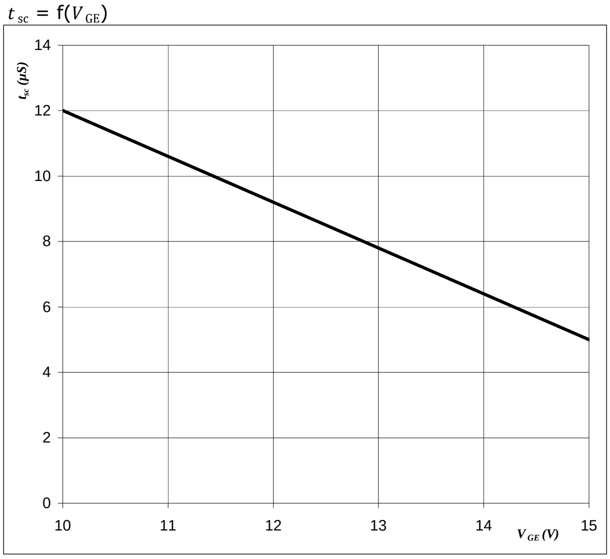
At

I_C =	10	A

Figure 27 Inverter IGBT

Short circuit withstand time as a function of gate-emitter voltage

$t_{sc} = f(V_{GE})$



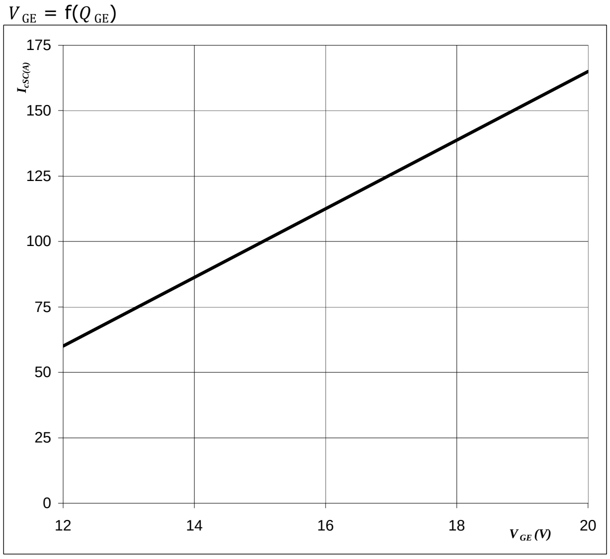
At

V_{CE} =	600	V
T_j ≤	175	ºC

Figure 28 Inverter IGBT

Typical short circuit collector current as a function of gate-emitter voltage

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



At

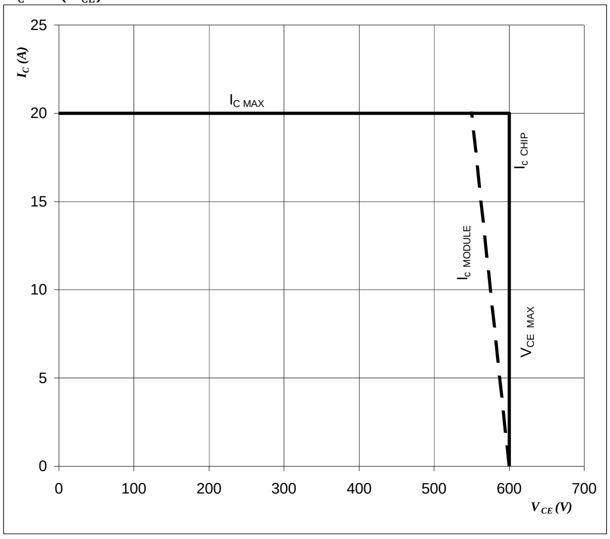
V_{CE} ≤	600	V
T_j =	175	ºC

Inverter Characteristics

Figure 29	Inverter IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

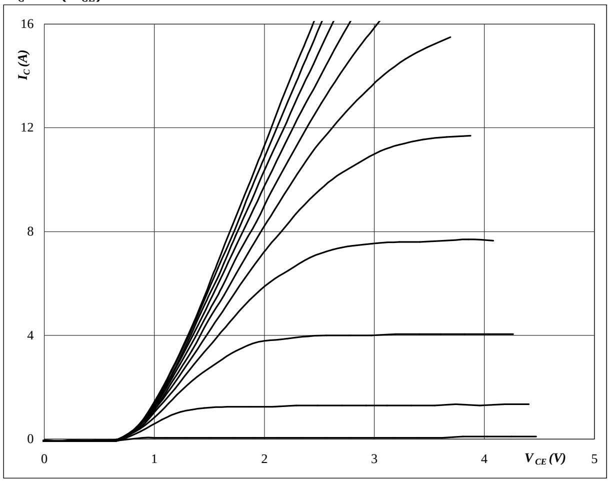
T_j = T_{jmax}-25 ºC

Brake Characteristics

Figure 1 Brake IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

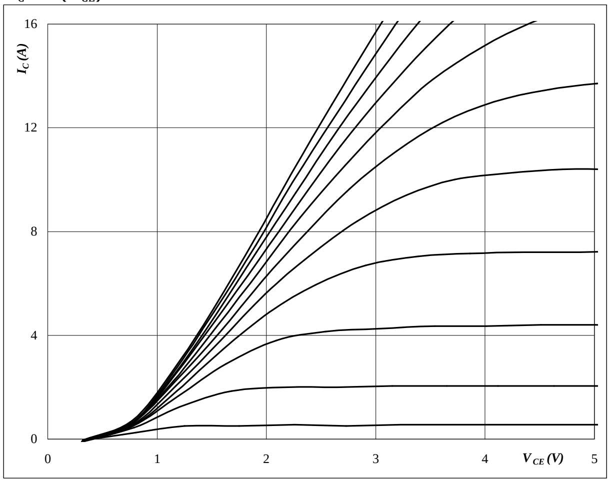
T_j = 25 °C

V_{GE} from 7 V to 17 V in steps of 1 V

Figure 2 Brake IGBT

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

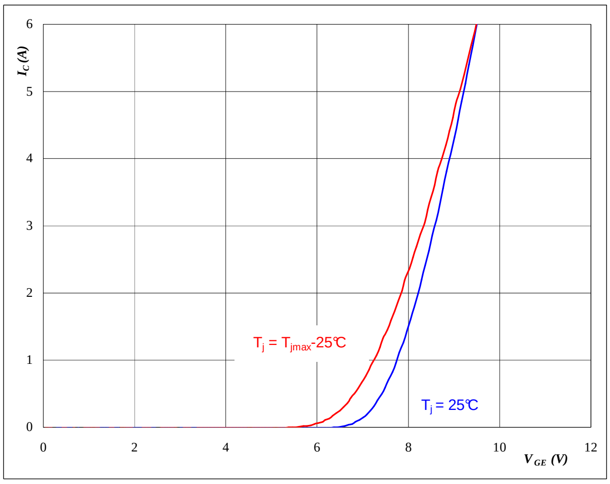
T_j = 125 °C

V_{GE} from 7 V to 17 V in steps of 1 V

Figure 3 Brake IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$



At

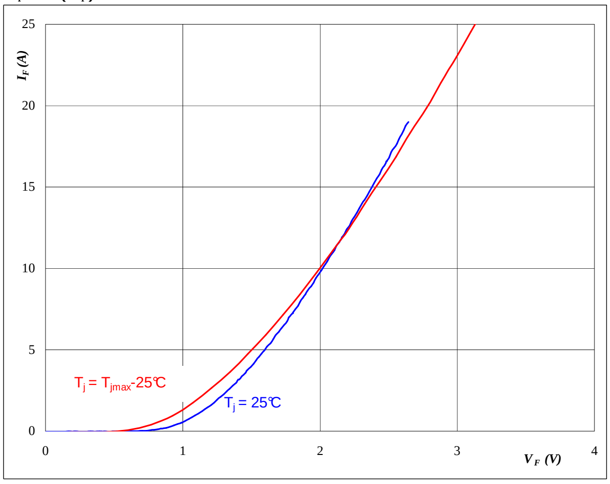
t_p = 250 µs

V_{CE} = 10 V

Figure 4 Brake FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

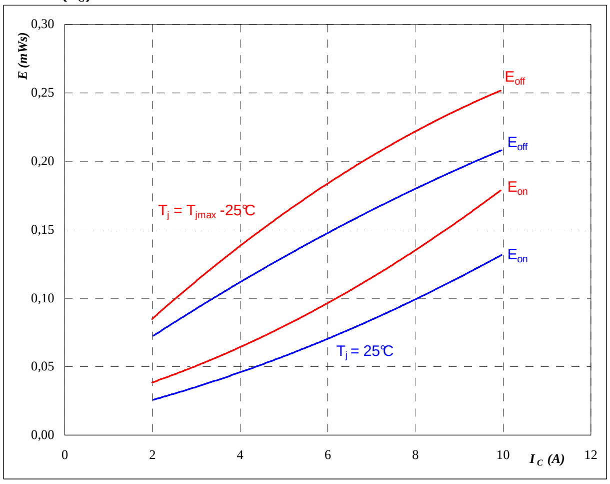
t_p = 250 µs

Brake Characteristics

Figure 5 Brake IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



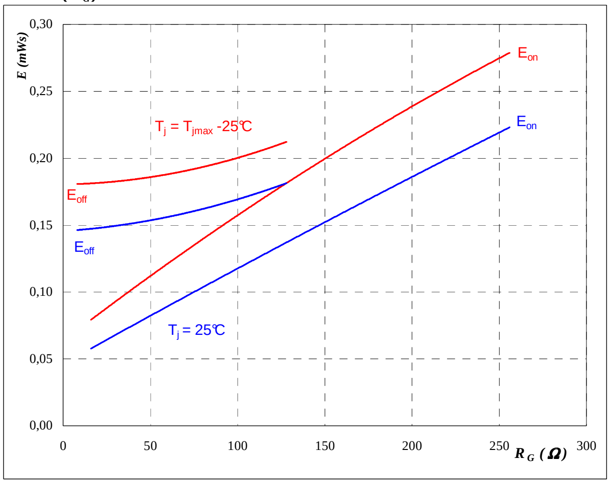
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω
R_{goff} =	16	Ω

Figure 6 Brake IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



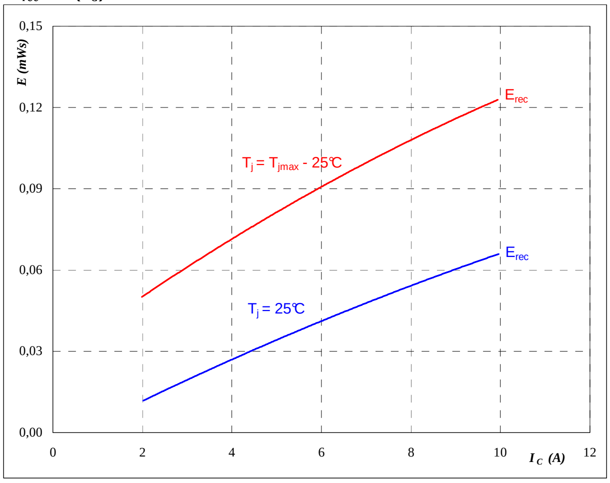
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	6	A

Figure 7 Brake FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



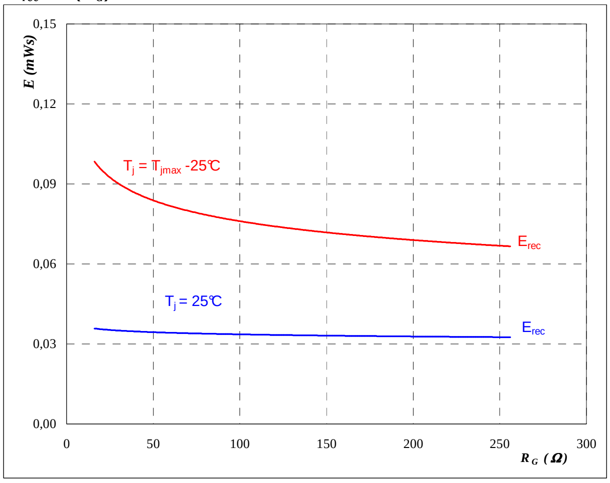
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω

Figure 8 Brake FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

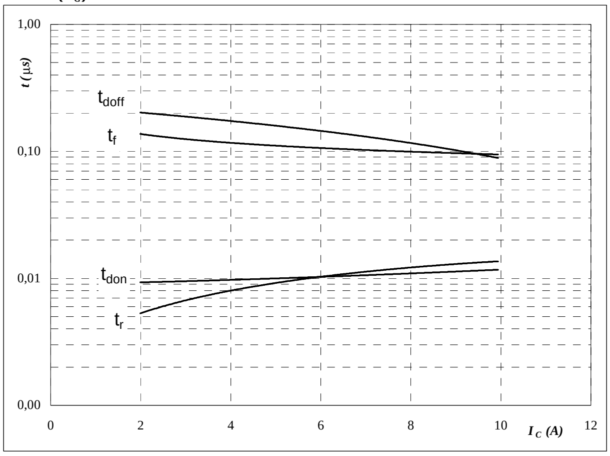
T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	6	A

Brake Characteristics

Figure 9	Brake IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



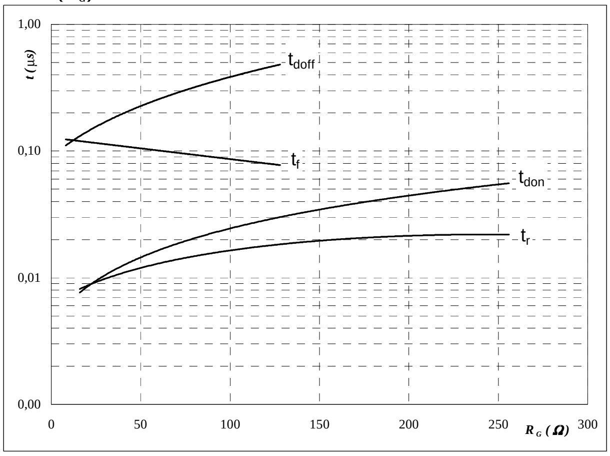
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	15	V
R_{gon} =	32	Ω
R_{goff} =	16	Ω

Figure 10	Brake IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



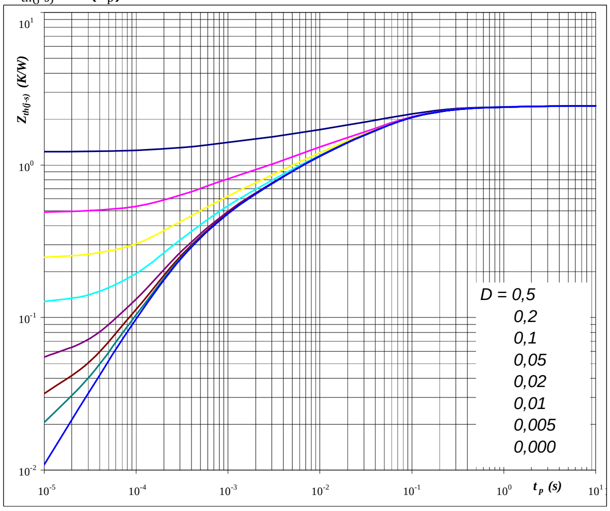
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	15	V
I_C =	6	A

Figure 11	Brake IGBT

IGBT transient thermal impedance as a function of pulse width

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



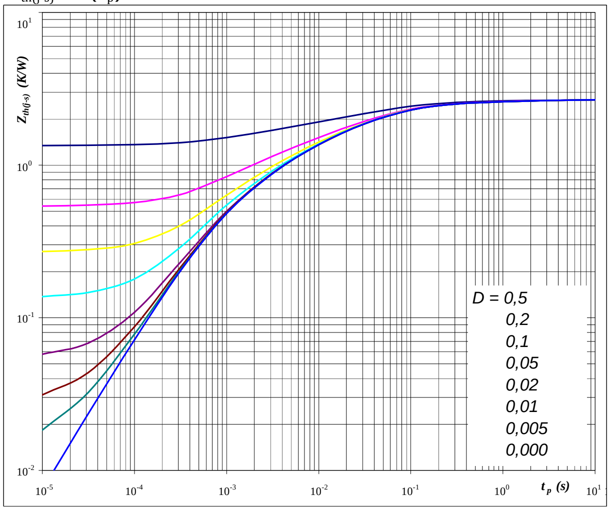
At

D =	t_p / T	
$R_{th(j\text{-}s)}$ =	2,44	K/W

Figure 12	Brake FWD

FWD transient thermal impedance as a function of pulse width

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



At

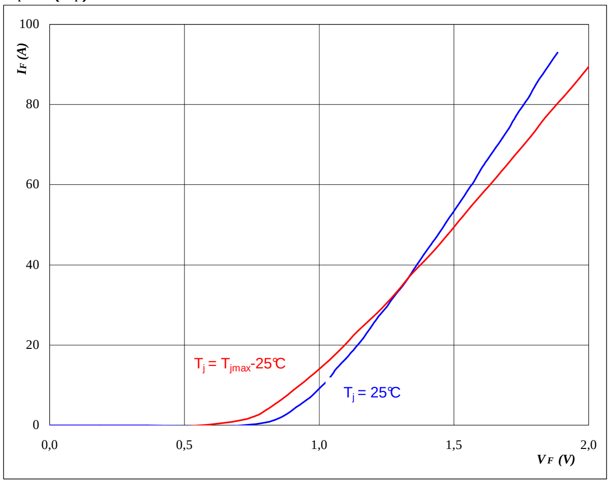
D =	t_p / T	
$R_{th(j\text{-}s)}$ =	2,68	K/W

Rectifier Diode Characteristics

Figure 1 Rectifier diode

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



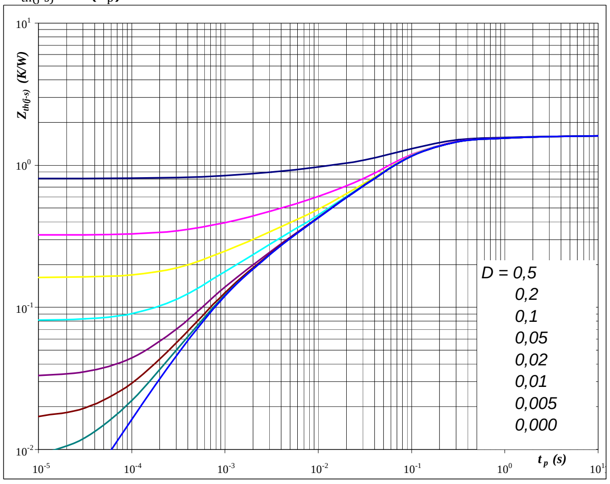
At

t_p = 250 µs

Figure 2 Rectifier diode

Diode transient thermal impedance as a function of pulse width

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



At

$D = t_p / T$

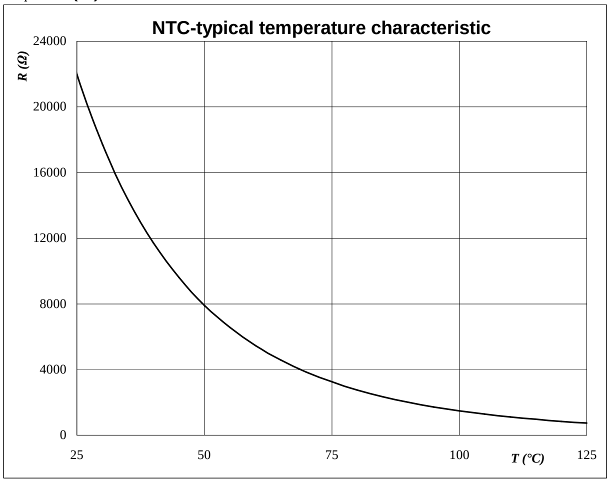
$R_{th(j\text{-}s)}$ = 1,61 K/W

Thermistor Characteristics

Figure 1 Thermistor

Typical NTC characteristic as a function of temperature

$R_T = f(T)$



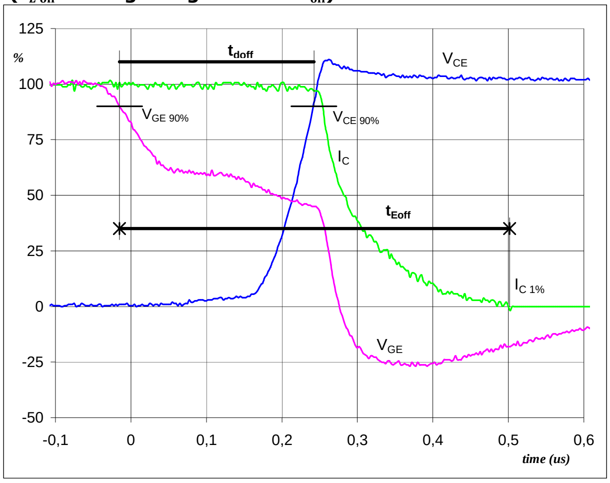
Switching Definitions Inverter

General conditions

T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	16 Ω

Figure 1 Inverter IGBT

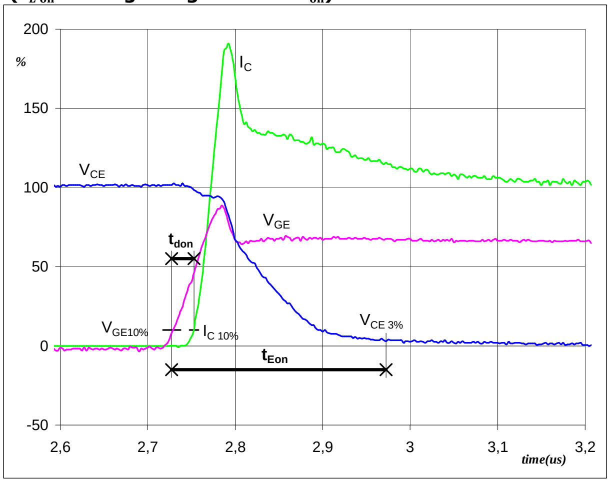
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	10	A
t_{doff} =	0,26	μs
$t_{E\,off}$ =	0,52	μs

Figure 2 Inverter IGBT

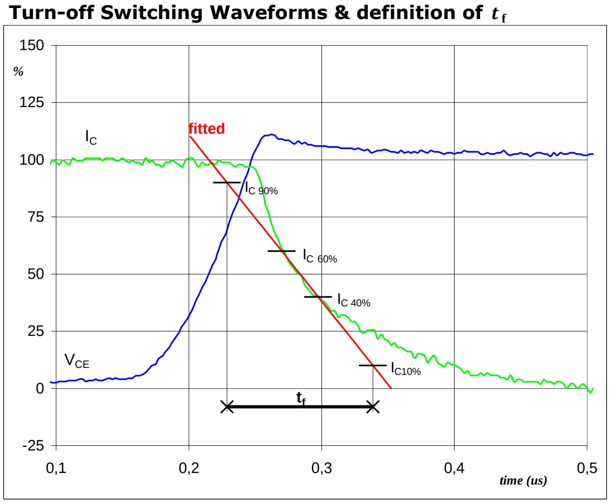
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	10	A
t_{don} =	0,02	μs
$t_{E\,on}$ =	0,24	μs

Figure 3 Inverter IGBT

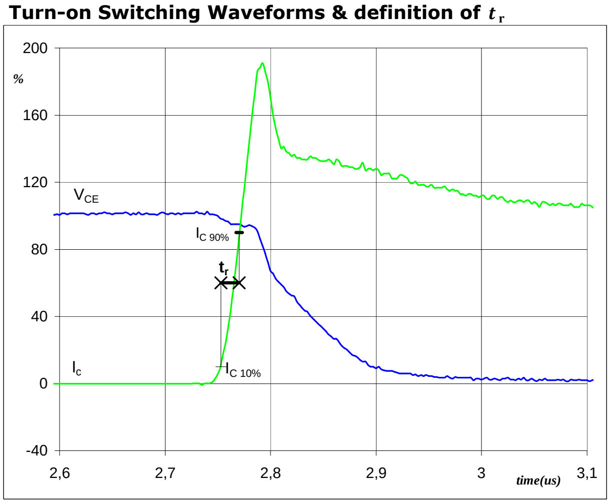
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	300	V
I_C (100%) =	10	A
t_f =	0,10	μs

Figure 4 Inverter IGBT

Turn-on Switching Waveforms & definition of t_r

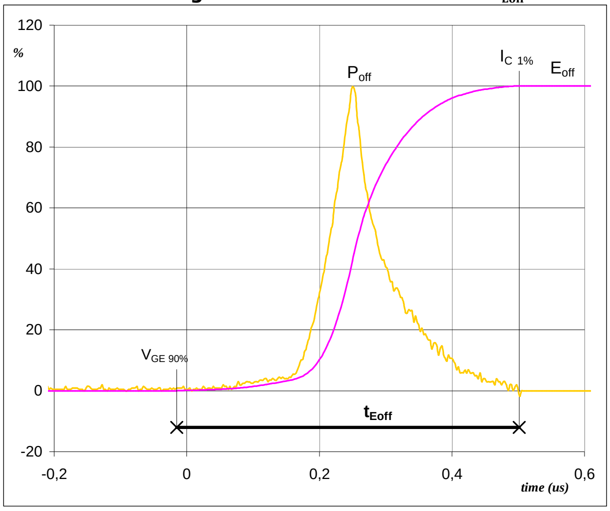


V_C (100%) =	300	V
I_C (100%) =	10	A
t_r =	0,02	μs

Switching Definitions Inverter

Figure 5 Inverter IGBT

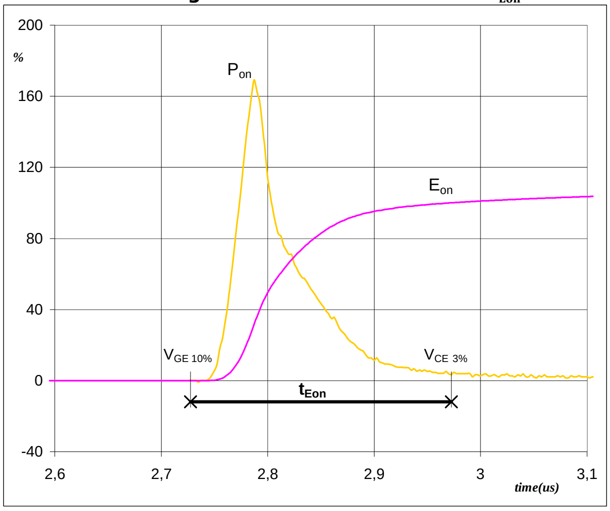
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	2,99	kW
E_{off} (100%) =	0,30	mJ
$t_{E\ off}$ =	0,52	µs

Figure 6 Inverter IGBT

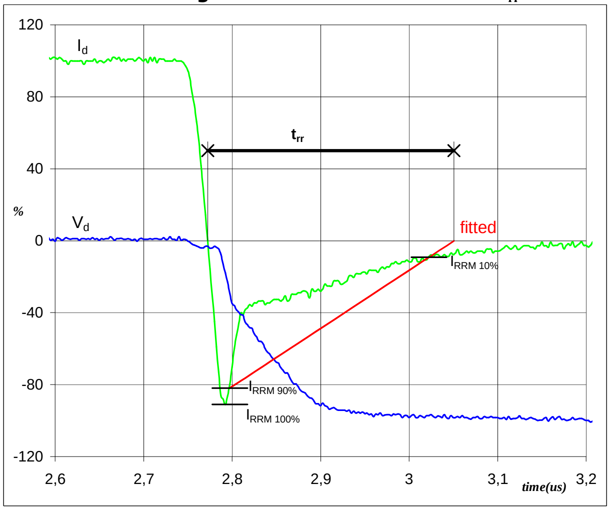
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	2,99	kW
E_{on} (100%) =	0,31	mJ
$t_{E\ on}$ =	0,24	µs

Figure 7 Inverter IGBT

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

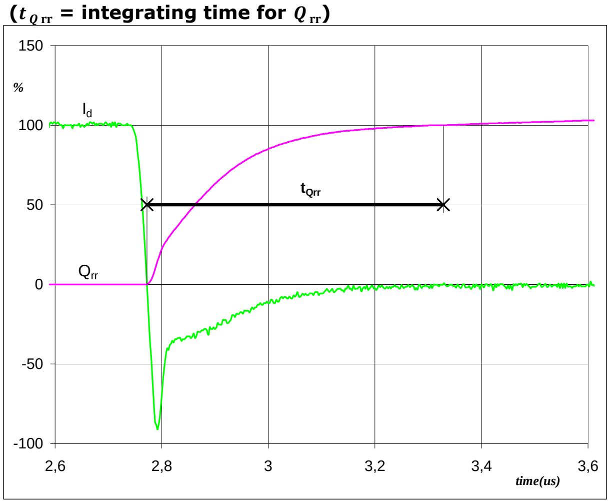


V_d (100%) =	300	V
I_d (100%) =	10	A
I_{RRM} (100%) =	9	A
t_{rr} =	0,26	µs

Switching Definitions Inverter

Figure 8 Inverter FWD

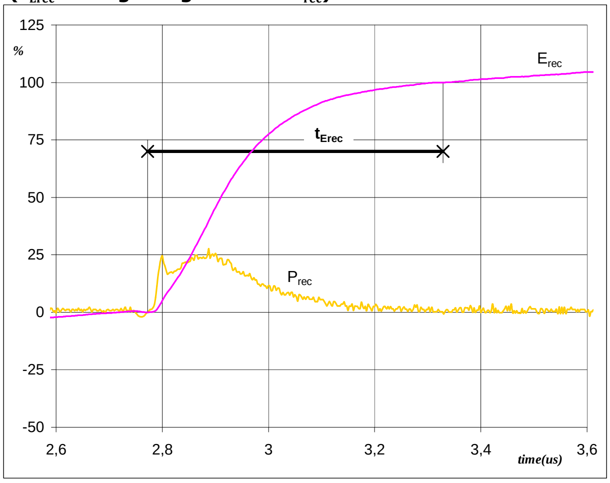
Turn-on Switching Waveforms & definition of t_{Qrr}
(t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	10	A
Q_{rr} (100%) =	0,82	µC
t_{Qrr} =	0,56	µs

Figure 9 Inverter FWD

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



P_{rec} (100%) =	2,99	kW
E_{rec} (100%) =	0,16	mJ
t_{Erec} =	0,56	µs

Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

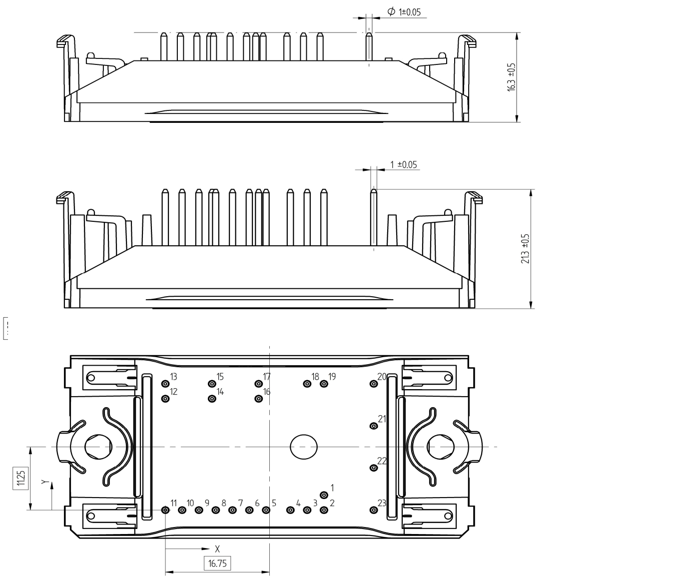
Version	Ordering Code
without thermal paste 12mm housing with solder pins	V23990-P543-A28-PM
with thermal paste 12mm housing with solder pins	V23990-P543-A28-/3/-PM
without thermal paste 17mm housing with solder pins	V23990-P543-A29-PM
with thermal paste 17mm housing with solder pins	V23990-P543-A29-/3/-PM
without thermal paste 1 phase rectifier 12mm housing with solder pins	V23990-P543-B28-PM
with thermal paste 1 phase rectifier 12mm housing with solder pins	V23990-P543-B28-/3/-PM
without thermal paste 1 phase rectifier 12mm housing with solder pins	V23990-P543-B128-PM
with thermal paste 1 phase rectifier 12mm housing with solder pins	V23990-P543-B128-/3/-PM
without thermal paste 1 phase rectifier 17mm housing with solder pins	V23990-P543-B129-PM
with thermal paste 1 phase rectifier 17mm housing with solder pins	V23990-P543-B129-/3/-PM
without thermal paste without brake 12mm housing with solder pins	V23990-P543-C28-PM
with thermal paste without brake 12mm housing with solder pins	V23990-P543-C28-/3/-PM
without thermal paste without brake 17mm housing with solder pins	V23990-P543-C29-PM
with thermal paste without brake 17mm housing with solder pins	V23990-P543-C29-/3/-PM
without thermal paste without brake 1 phase rectifier 12mm housing with solder pins	V23990-P543-D28-PM
with thermal paste without brake 1 phase rectifier 12mm housing with solder pins	V23990-P543-D28-/3/-PM
without thermal paste without brake 1 phase rectifier 17mm housing with solder pins	V23990-P543-D129-PM
with thermal paste without brake 1 phase rectifier 17mm housing with solder pins	V23990-P543-D129-/3/-PM

Text	VIN	Date code	Name&Ver	UL	Lot	Serial
	VIN	WWYY	NNNNNNNVV	UL	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table

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

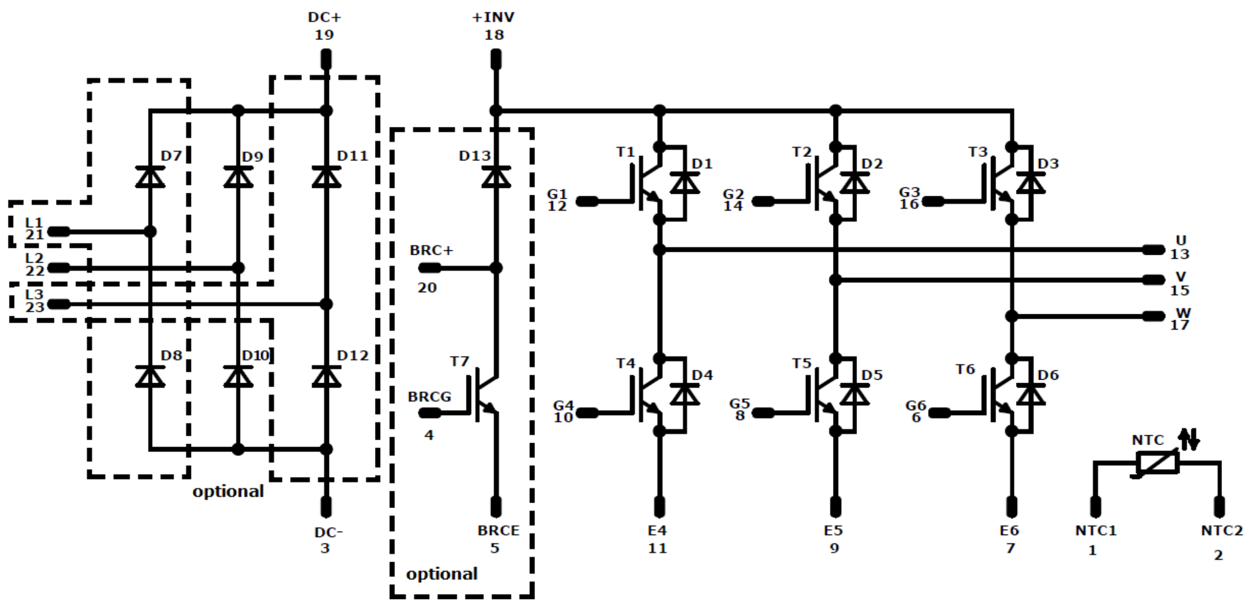


Pinout variation

Modul subtype	Not assembled pins
P543-A2x	-
P543-B2x	21
P543-B12x	23
P543-C2x	4,5,20
P543-D2x	4,5,20,21
P543-D12x	4,5,20,23

Ordering Code and Marking - Outline - Pinout

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
D7-D12	Diode	1600 V	25 A	Rectifier Diode	
T1-T6	IGBT	600 V	10 A	Inverter Switch	
D1-D6	FWD	600 V	10 A	Inverter Diode	
T7	IGBT	600 V	6 A	Brake Switch	
D13	FWD	600 V	6 A	Brake Diode	
NTC	NTC			Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	**135**	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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
V23990-P543-A28-PM-D8-14	25 Nov. 2018	R_{th}, I_{max}, P_{tot}, Clearance values updated	All

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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.