Vincotech

flow PIM 1	600 V / 30 A

Features

- Three-phase rectifier, optional BRC, Inverter, NTC
- Very compact housing, easy to route
- Trenchstop™ IGBT3 for low saturation losses

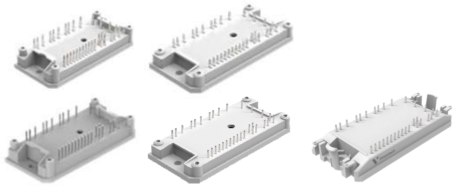
Target Applications

- Industrial drives
- Embedded drives

Types

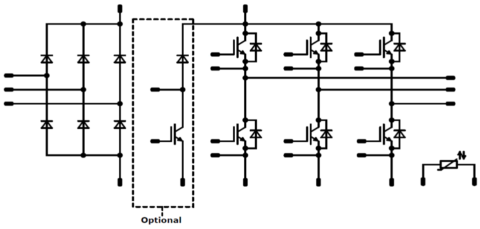
- V23990-P585-A20-PM
- V23990-P585-A20Y-PM
- V23990-P585-A208-PM
- V23990-P585-A208Y-PM
- V23990-P585-C20-PM
- V23990-P585-C20Y-PM
- 10-TY06PMA030SA-P585A206

flow 1 housing



4 tower / 17 mm   4 tower / 12 mm   2 clips / 12 mm

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	33	A
Surge (non-repetitive) forward current	I_{FSM}	t_p = 10 ms 50 Hz half sine wave		250	A
I2t-value	I^2t			310	A^2s
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	37	W
Maximum Junction Temperature	T_{jmax}			150	°C
Inverter Switch					
Collector-emitter breakdown voltage	V_{CE}			600	V
DC collector current	I_C			30	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		90	A
Turn off safe operating area		V_{CE} ≤ 1200V, $T_j \le T_{op}$ max		90	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	55	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	25	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		60	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	46	W
Maximum Junction Temperature	T_{jmax}			175	°C
Brake Switch					
Collector-emitter breakdown voltage	V_{CE}			600	V
DC collector current	I_C			20	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		60	A
Turn off safe operating area		V_{CE} ≤ 1200V, $T_j \le T_{op}$ max		65	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	45	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	14	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		40	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	20	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 Test Voltage	4000	V
Creepage distance				min 12,7	mm
Clearance		12 mm housing solder pin / press-fit pin		7,91 / 7,96	mm
		17 mm housing		min 12,7	mm
Comparative Tracking Index	CTI			>200	

Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Rectifier Diode										
Forward voltage	V_F				30	25 125	0,8	1,16 1,13	1,6	V
Threshold voltage (for power loss calc. only)	V_{to}				30	25 125		0,90 0,78		V
Slope resistance (for power loss calc. only)	r_t				30	25 125		8 11		mΩ
Reverse current	I_r			1500		150			2	mA
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						1,89		K/W
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,17		K/W
Inverter Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00043	25	4,1	4,9	5,7	V
Collector-emitter saturation voltage	V_{CEsat}		15		30	25 125	1,1	1,70 1,77	1,9	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		25 125		0,04 1		mA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 16 Ω R_{gon} = 16 Ω	15	300	30	25 125		93 93,5		ns
Rise time	t_r					25 125		15 17,5		
Turn-off delay time	$t_{d(off)}$					25 125		141 159,5		
Fall time	t_f					25 125		67,1 86,7		
Turn-on energy loss	E_{on}					25 125		0,42 0,63		mWs
Turn-off energy loss	E_{off}					25 125		0,59 0,80		
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		1630		pF
Output capacitance	C_{oss}							108		
Reverse transfer capacitance	C_{rss}							50		
Gate charge	Q_G		15	480	30	25		167		nC
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						1,6		K/W
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,37		K/W

Characteristic Values

Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	Unit
Inverter Diode										
Diode forward voltage	V_F				30	25 125	1,25	1,75 1,70	1,95	V
Peak reverse recovery current	I_{RRM}	R_{gon} = 16 Ω	-15	300	30	25 125		29 34		A
Reverse recovery time	t_{rr}					25 125		35 183		ns
Reverse recovered charge	Q_{rr}					25 125		1,20 2,16		μC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		2200 1576		A/μs
Reverse recovered energy	E_{rec}					25 125		0,23 0,45		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						2,07		K/W
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,81		K/W
Brake Switch										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00029	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		20	25 125	1,1	1,55 1,75	1,9	V
Collector-emitter cut-off incl diode	I_{CES}		0	600		25 125			0,04 1	mA
Gate-emitter leakage current	I_{GES}		20	0		25			300	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 32 Ω R_{gon} = 32 Ω	±15	300	20	25 125		126 128		ns
Rise time	t_r					25 125		18 21		
Turn-off delay time	$t_{d(off)}$					25 125		161 179		
Fall time	t_f					25 125		105 114		
Turn-on energy loss	E_{on}					25 125		0,44 0,59		mWs
Turn-off energy loss	E_{off}					25 125		0,49 0,63		
Input capacitance	C_{ies}	f = 1 MHz	0	25	20	25		1100		pF
Output capacitance	C_{oss}							71		
Reverse transfer capacitance	C_{rss}							32		
Gate charge	Q_G		15	480	20	25		120		nC
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						2,12		K/W
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,83		K/W

Characteristic Values

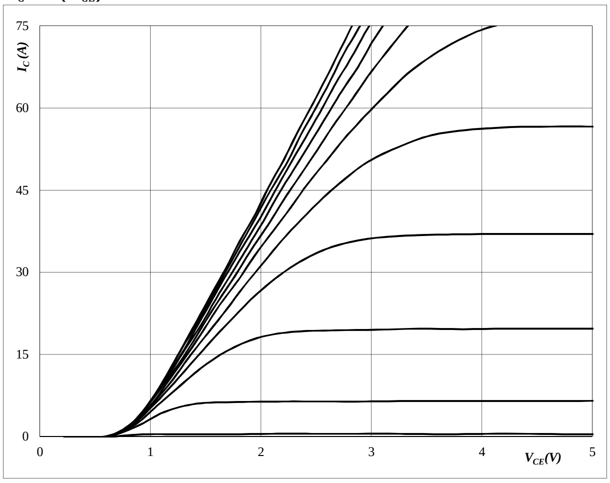
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Brake Diode										
Diode forward voltage	V_F				20	25 125	1,25	1,43 1,29	1,95	V
Reverse leakage current	I_r			600		25			27	µA
Peak reverse recovery current	I_{RRM}	R_{gon} = 32 Ω R_{gon} = 32 Ω	-15	300	20	25 125		10 11		A
Reverse recovery time	t_{rr}					25 125		28 134		ns
Reverse recovered charge	Q_{rr}					25 125		0,29 0,29		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		1247 443		A/µs
Reverse recovery energy	E_{rec}					25 125		0,051 0,100		mWs
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						3,53		K/W
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						3,07		K/W
Thermistor										
Rated resistance	R					25		22000		Ω
Deviation of R_{100}	$\Delta_{R/R}$					100	-5		5	%
Power dissipation	P					25		200		mW
Power dissipation constant						25		2		mW/K
B-value	$B_{(25/50)}$	Tol. ±3%				25		3950		K
B-value	$B_{(25/100)}$					25		3996		K
Vincotech NTC Reference						25			B	

Output Inverter

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

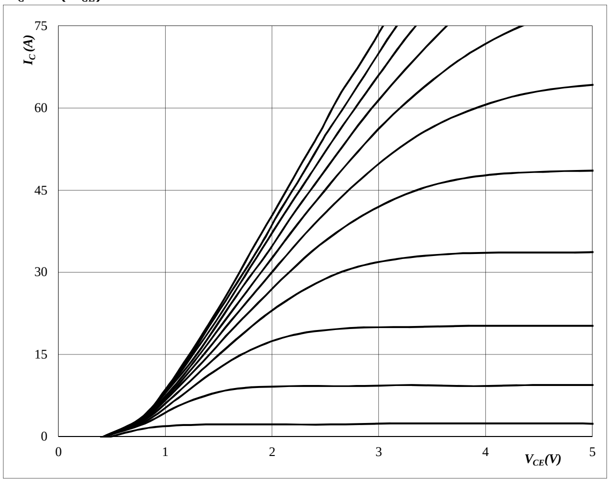
T_j = 25 °C

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

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

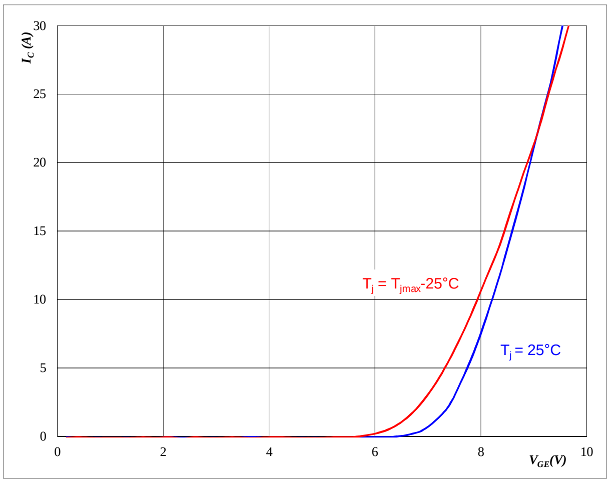
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



At

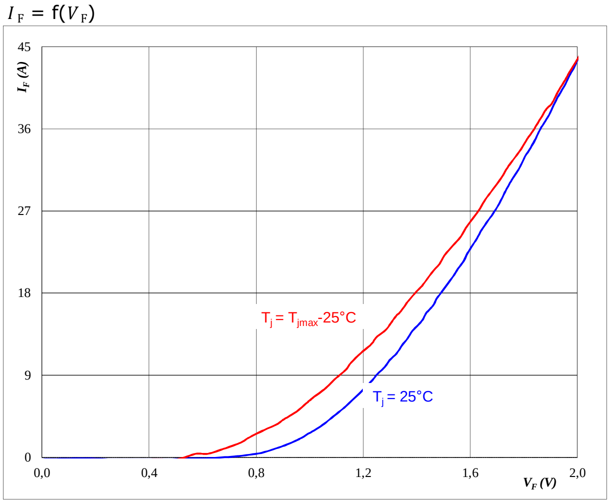
t_p = 250 µs

V_{CE} = 10 V

figure 4. **FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

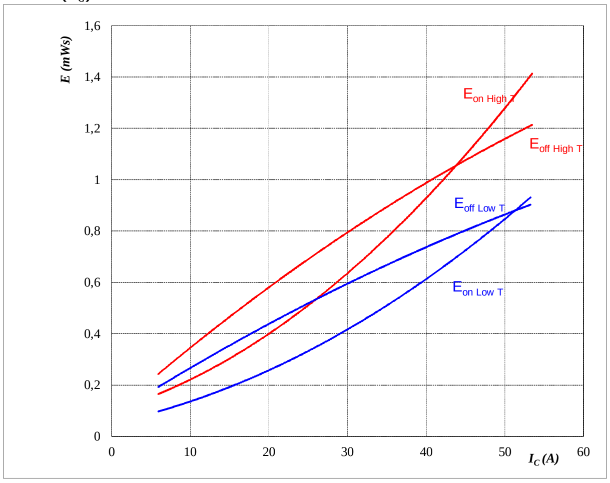
t_p = 250 µs

Output Inverter

figure 5. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



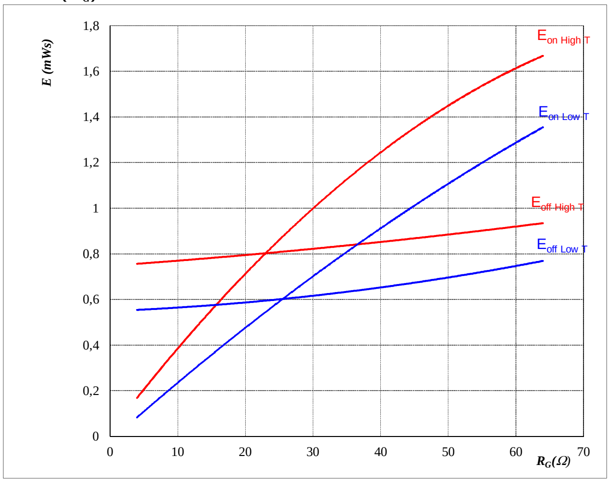
With an inductive load at

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

figure 6. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



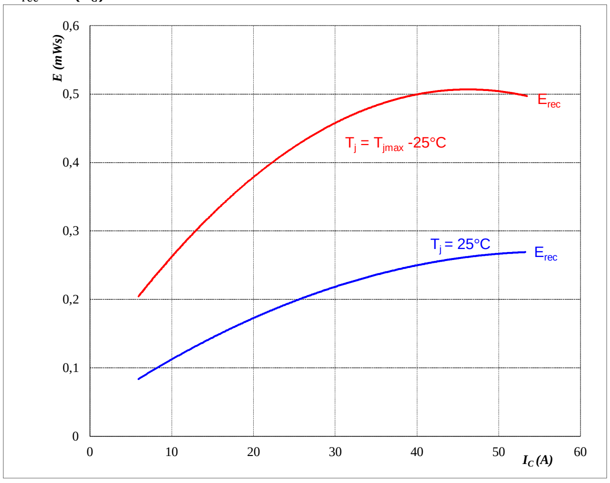
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	30	A

figure 7. **FWD**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



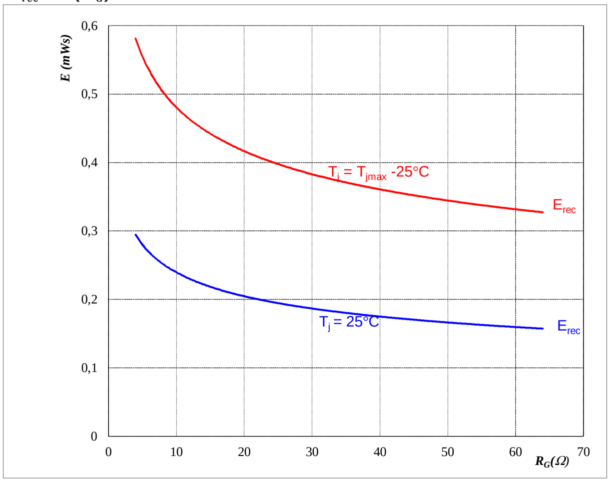
With an inductive load at

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

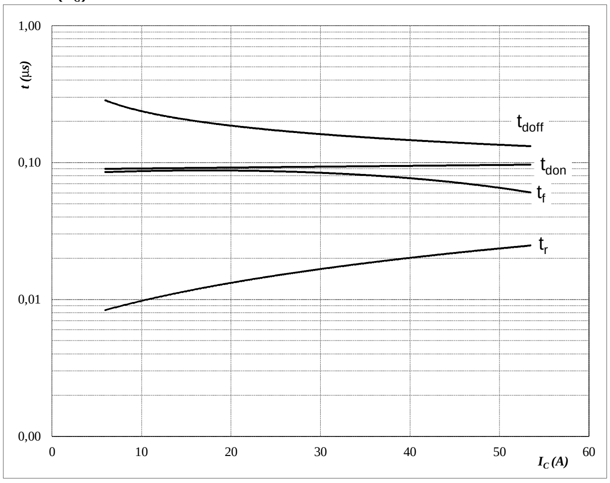
T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	30	A

Output Inverter

figure 9. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



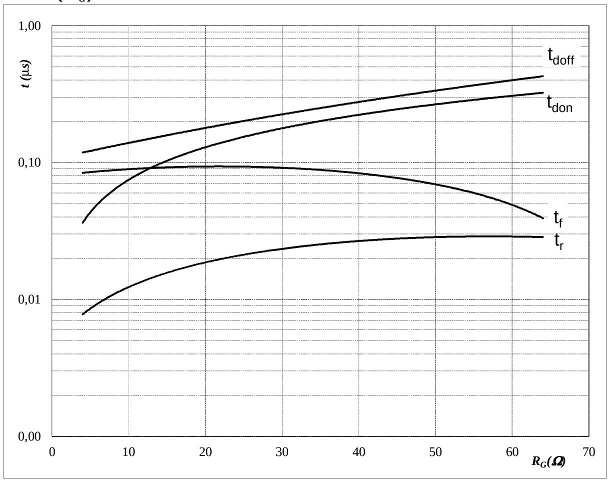
With an inductive load at

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

figure 10. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



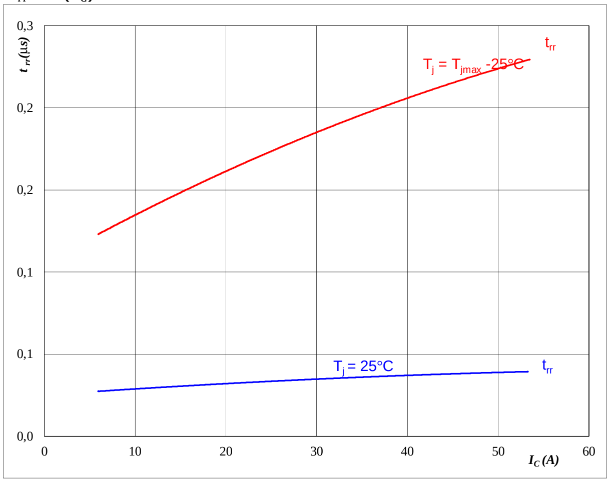
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	30	A

figure 11. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



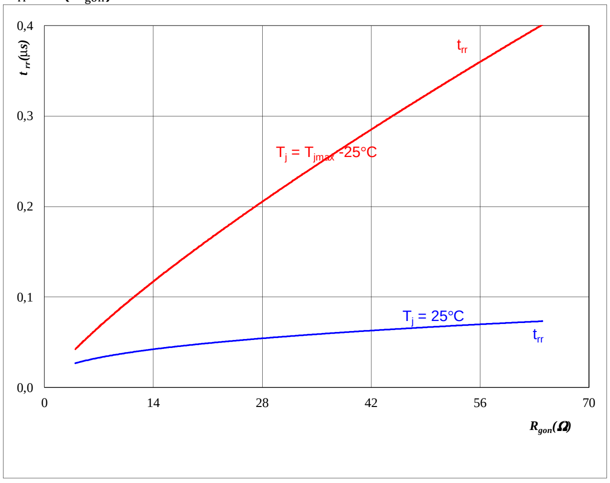
At

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

figure 12. **FWD**

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

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



At

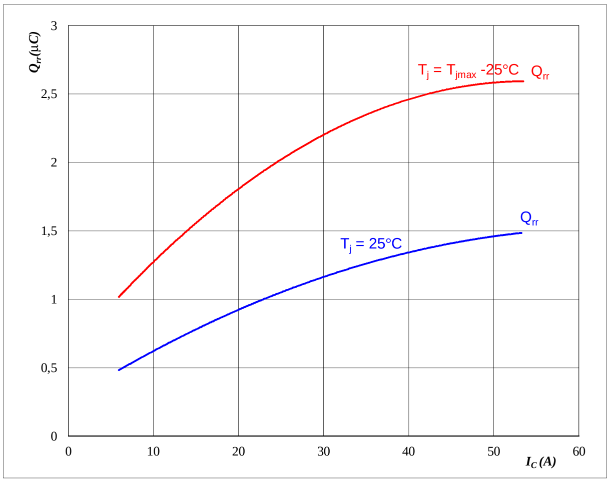
T_j =	25/125	°C
V_R =	300	V
I_F =	30	A
V_{GE} =	±15	V

Output Inverter

figure 13. **FWD**

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



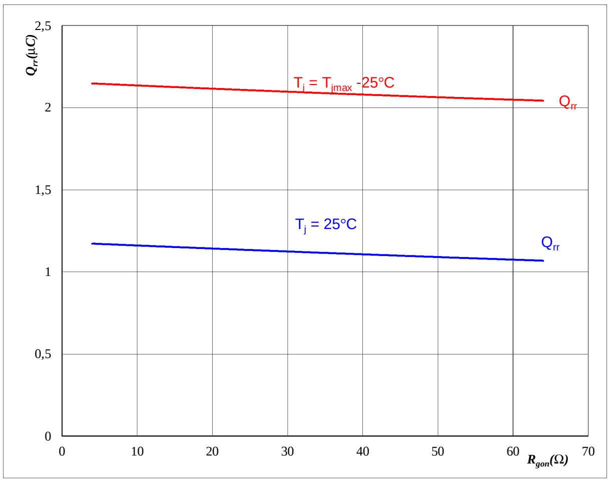
At

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

figure 14. **FWD**

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

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



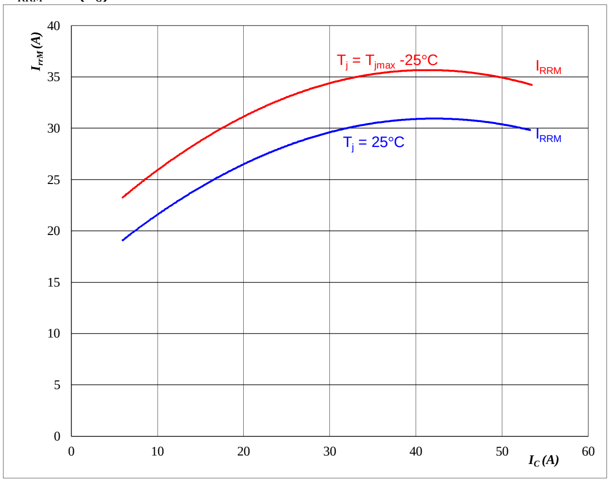
At

T_j =	25/125	°C
V_R =	300	V
I_F =	30	A
V_{GE} =	±15	V

figure 15. **FWD**

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



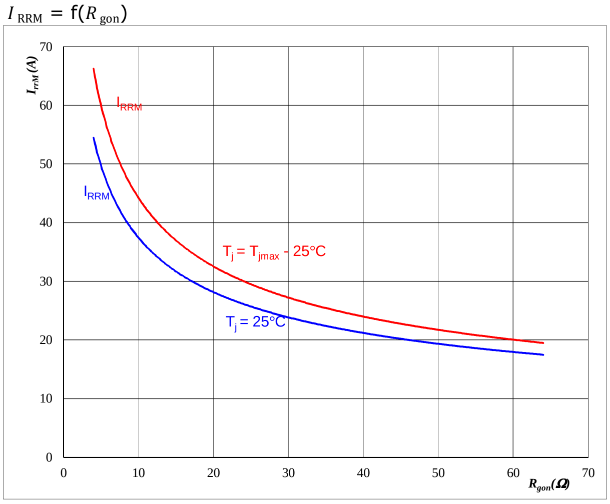
At

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

figure 16. **FWD**

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

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



At

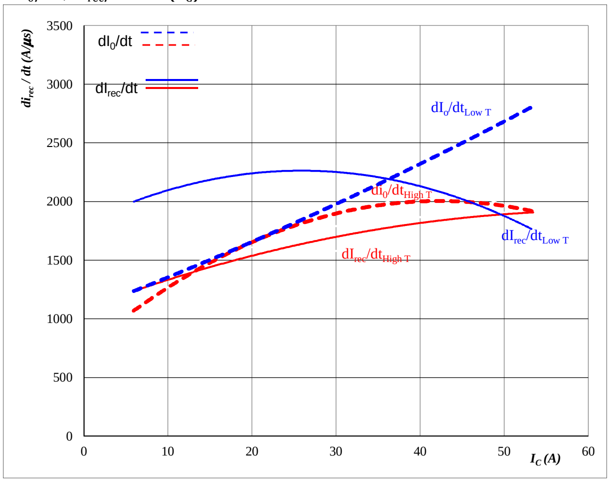
T_j =	25/125	°C
V_R =	300	V
I_F =	30	A
V_{GE} =	±15	V

Output Inverter

figure 17. **FWD**

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

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



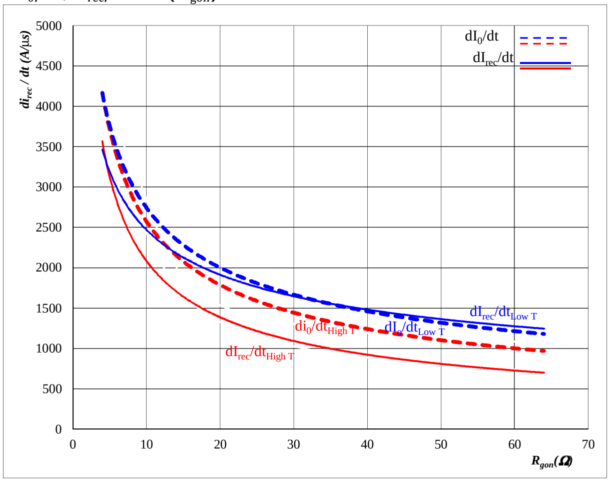
At

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

figure 18. **FWD**

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

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



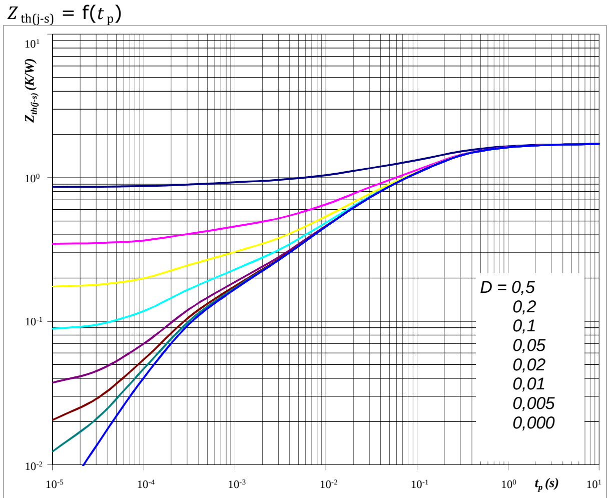
At

T_j =	25/125	°C
V_R =	300	V
I_F =	30	A
V_{GE} =	±15	V

figure 19. **IGBT**

IGBT transient thermal impedance as a function of pulse width

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



At

D = t_p / T

$R_{th(j\text{-}s)}$ = 1,60 K/W

Phase change material

$R_{th(j\text{-}s)}$ = 1,37 K/W

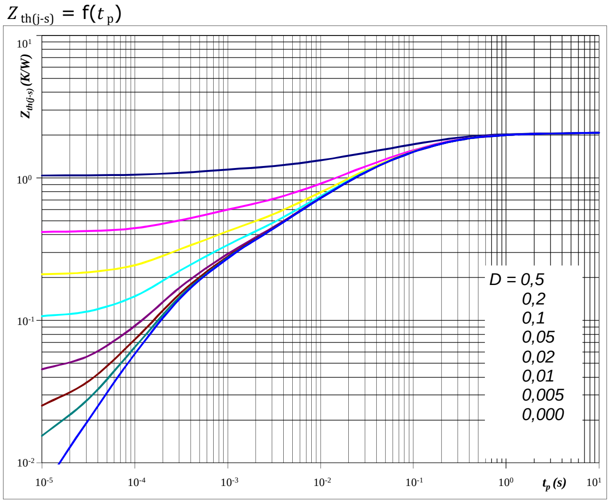
IGBT thermal model values

Thermal grease R (K/W)	Thermal grease Tau (s)	Phase change material R (K/W)	Phase change material Tau (s)
7,97E-02	2,79E+00	8,08E-02	1,65E+00
3,32E-01	3,84E-01	1,77E-01	2,46E-01
6,25E-01	1,06E-01	7,50E-01	6,44E-02
3,61E-01	1,55E-02	1,99E-01	1,77E-02
1,04E-01	2,61E-03	9,61E-02	4,57E-03
9,94E-02	2,47E-04	7,05E-02	6,56E-04

figure 20. **FWD**

FWD transient thermal impedance as a function of pulse width

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



At

D = t_p / T

$R_{th(j\text{-}s)}$ = 2,07 K/W

Phase change material

$R_{th(j\text{-}s)}$ = 1,81 K/W

FWD thermal model values

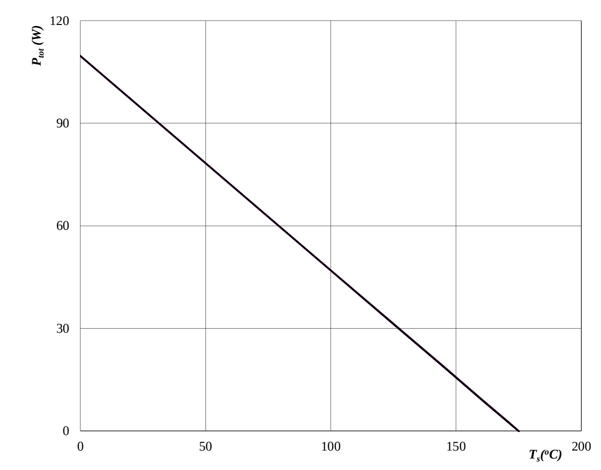
Thermal grease R (K/W)	Thermal grease Tau (s)	Phase change material R (K/W)	Phase change material Tau (s)
9,03E-02	2,69E+00	8,32E-02	4,59E+00
3,61E-01	3,13E-01	2,00E-01	4,81E-01
7,18E-01	7,88E-02	7,57E-01	9,25E-02
5,19E-01	1,60E-02	4,20E-01	1,80E-02
2,11E-01	2,84E-03	2,12E-01	3,31E-03
1,77E-01	3,27E-04	1,39E-01	3,46E-04

Output Inverter

figure 21. **IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



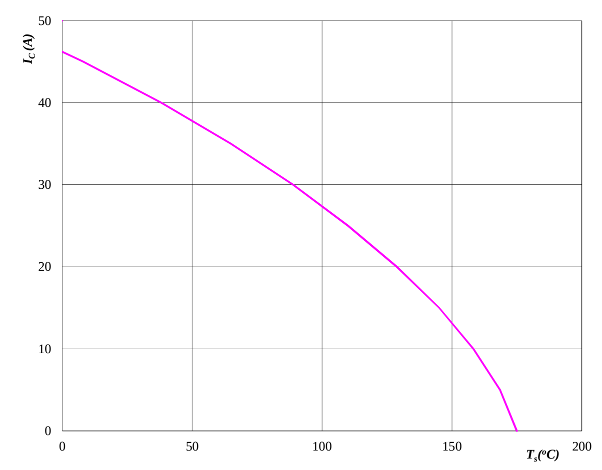
At

T_j = 175 °C

figure 22. **IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

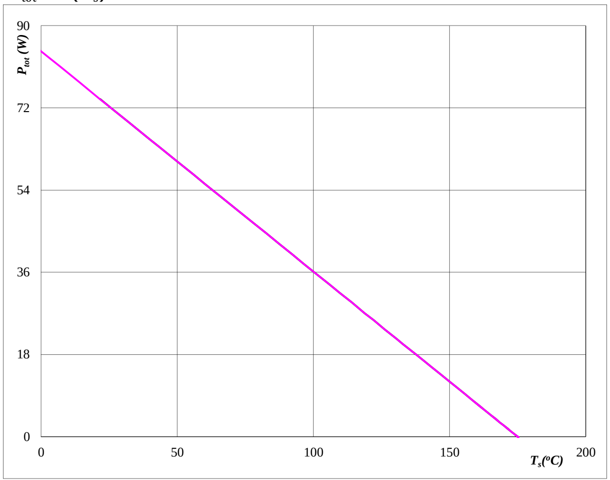
T_j = 175 °C

V_{GE} = 15 V

figure 23. **FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



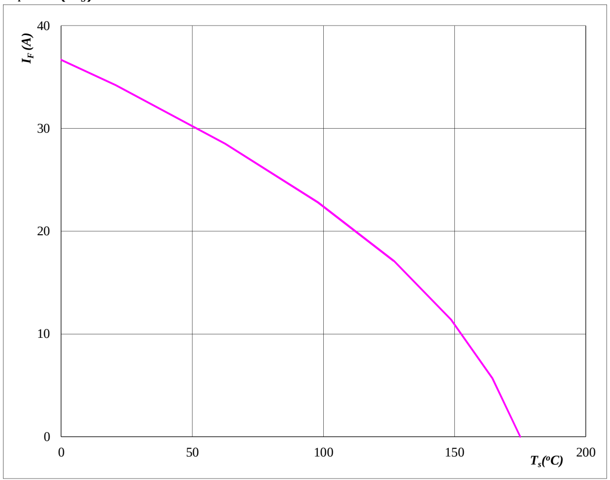
At

T_j = 175 °C

figure 24. **FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

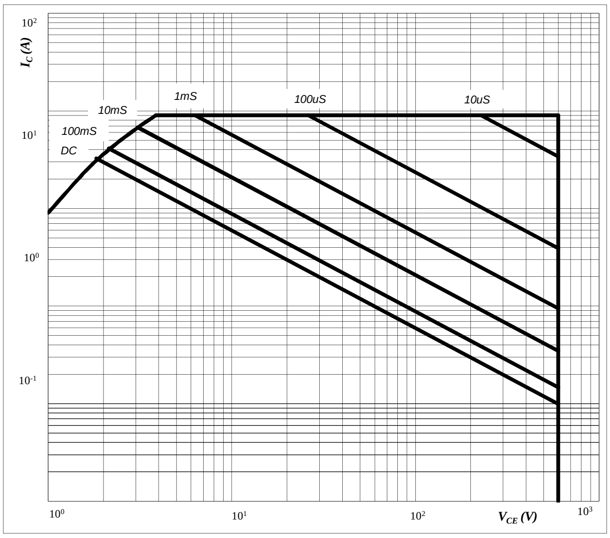
T_j = 175 °C

Output Inverter

figure 25. **IGBT**

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



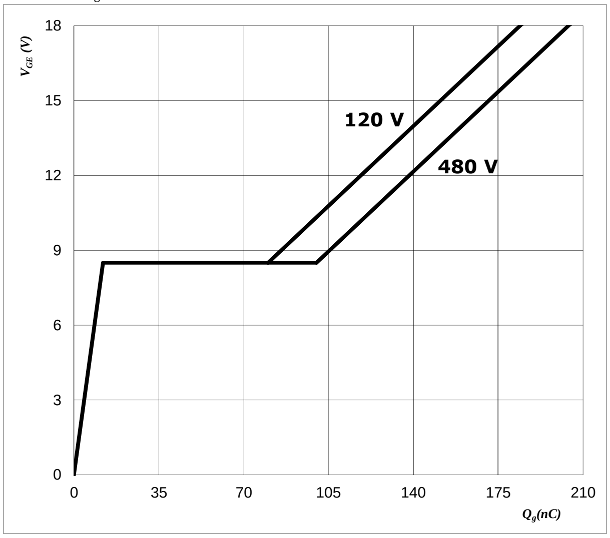
At

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

figure 26. **IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



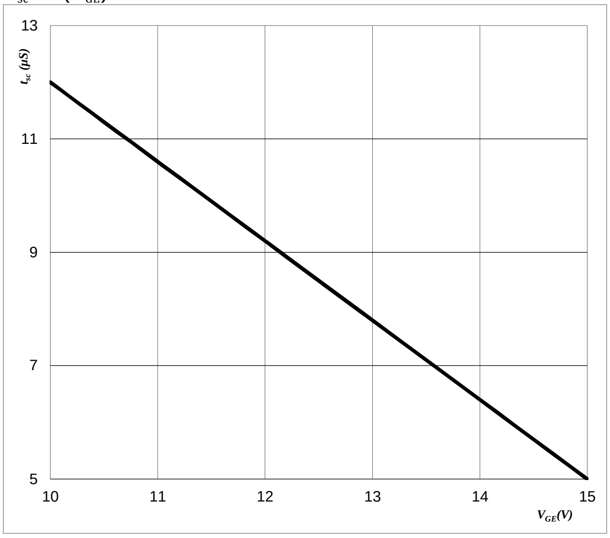
At

I_C =	30	A

figure 27. **IGBT**

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

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



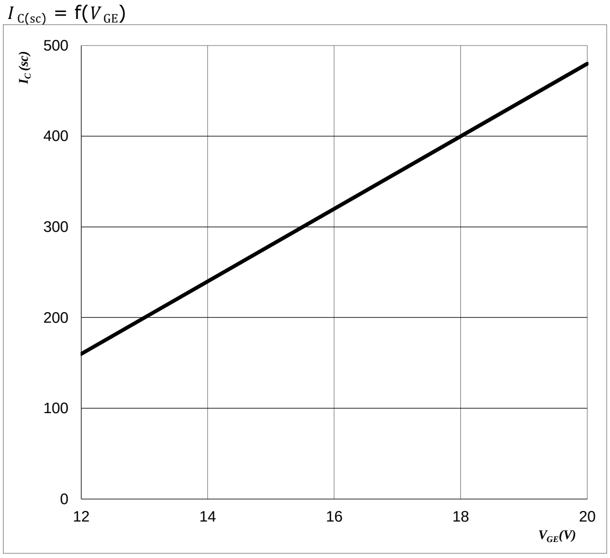
At

V_{CE} =	600	V
T_j ≤	175	ºC

figure 28. **IGBT**

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

$I_{C(sc)} = f(V_{GE})$



At

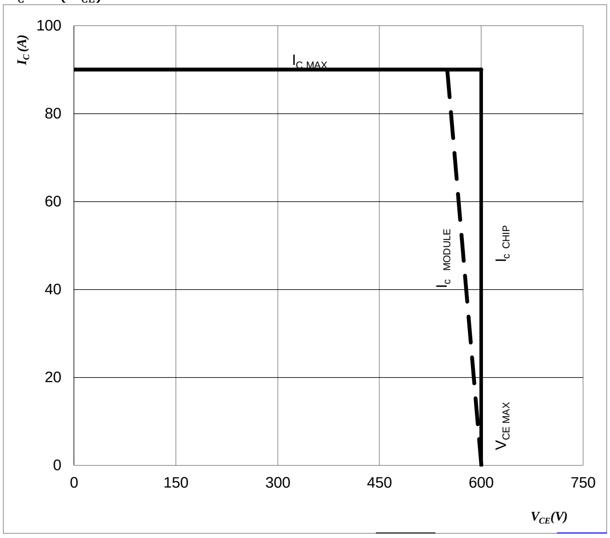
V_{CE} ≤	600	V
T_j =	175	ºC

Output Inverter

figure 29. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

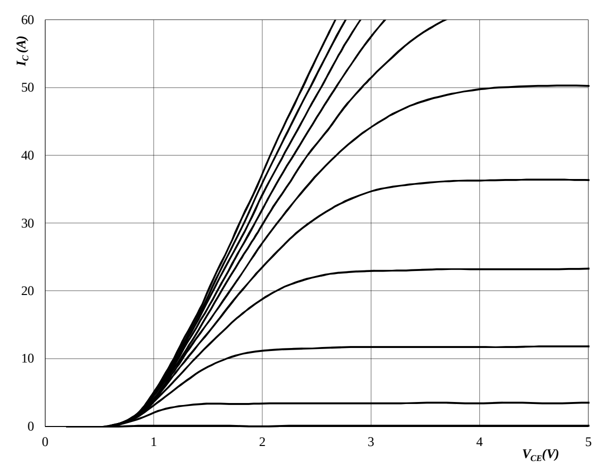
T_j = T_{jmax}-25 ºC

Brake

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

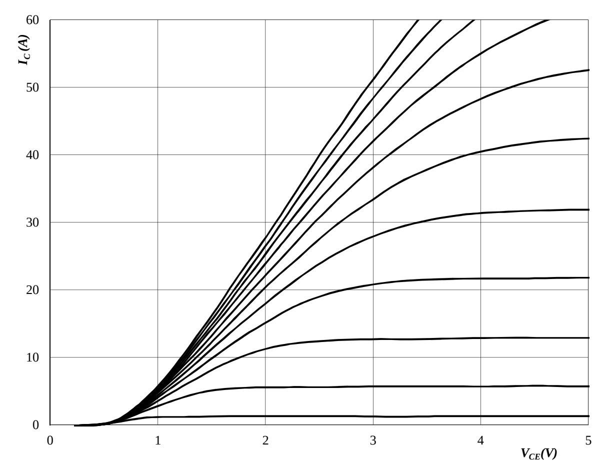
T_j = 25 °C

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

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



At

t_p = 250 µs

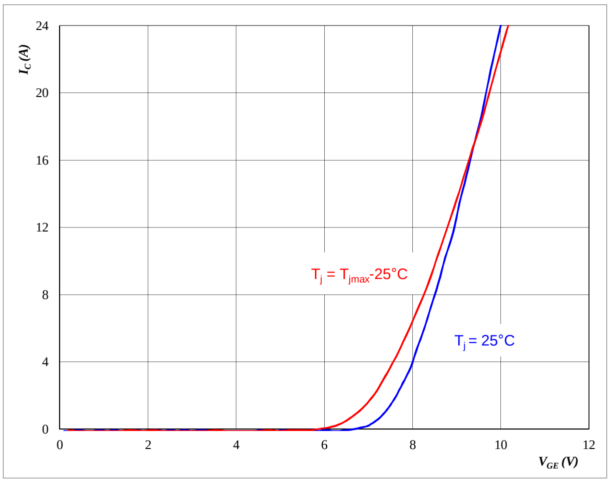
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



At

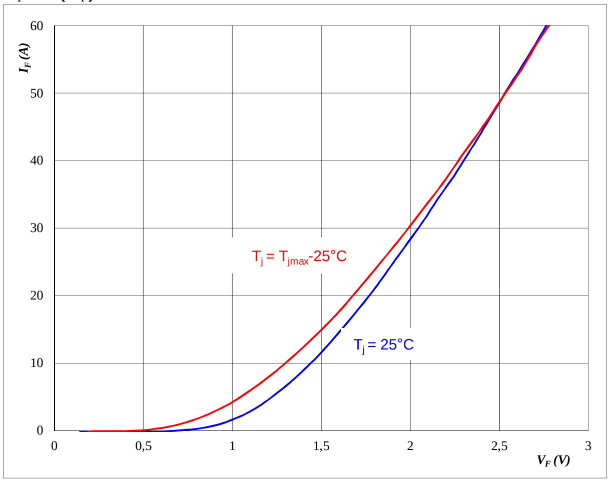
t_p = 250 µs

V_{CE} = 10 V

figure 4. **FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

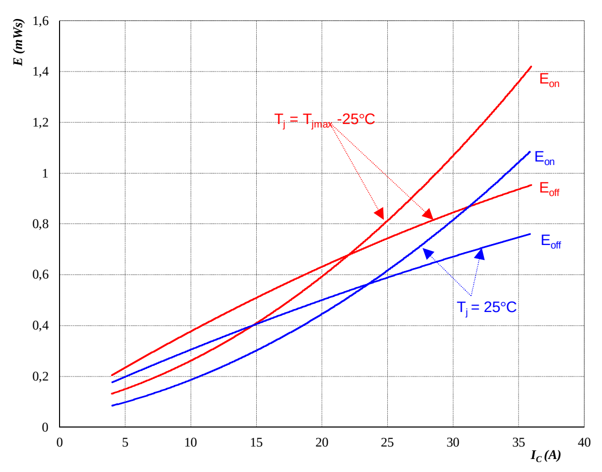
t_p = 250 µs

Brake

figure 5. **IGBT**

Typical switching energy losses
as a function of collector current

$E = f(I_C)$



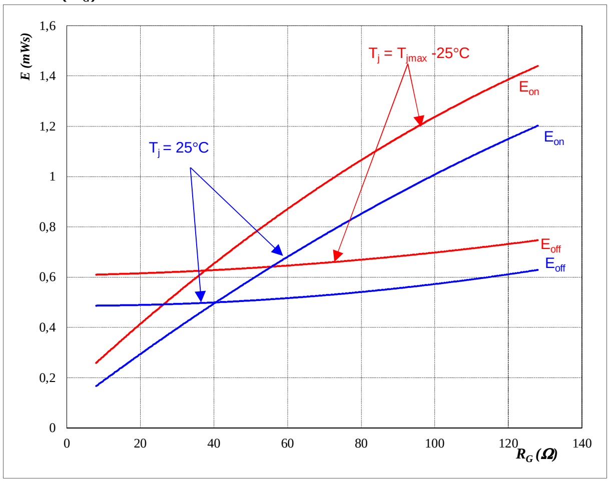
With an inductive load at

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

figure 6. **IGBT**

Typical switching energy losses
as a function of gate resistor

$E = f(R_G)$



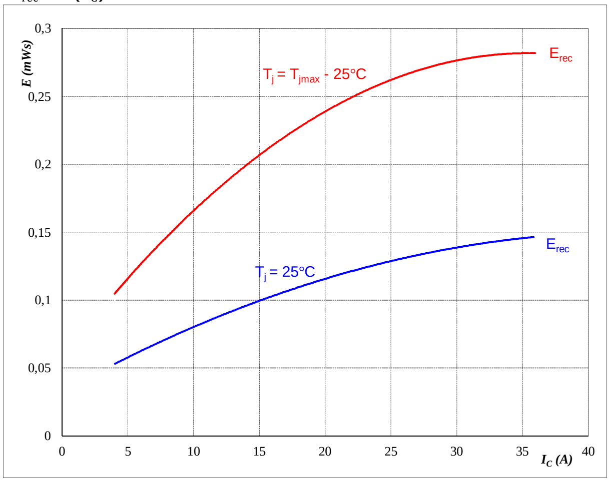
With an inductive load at

T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	20	A

figure 7. **FWD**

Typical reverse recovery energy loss
as a function of collector current

$E_{rec} = f(I_C)$



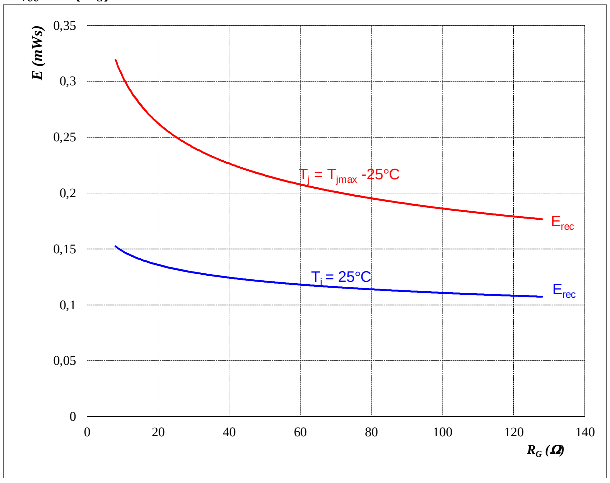
With an inductive load at

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

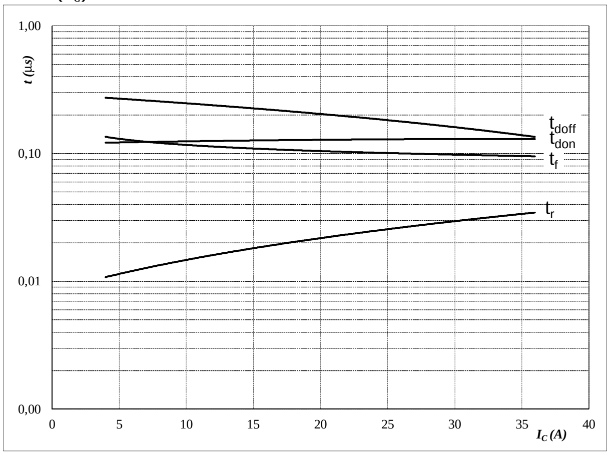
T_j =	25/125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	20	A

Brake

figure 9. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



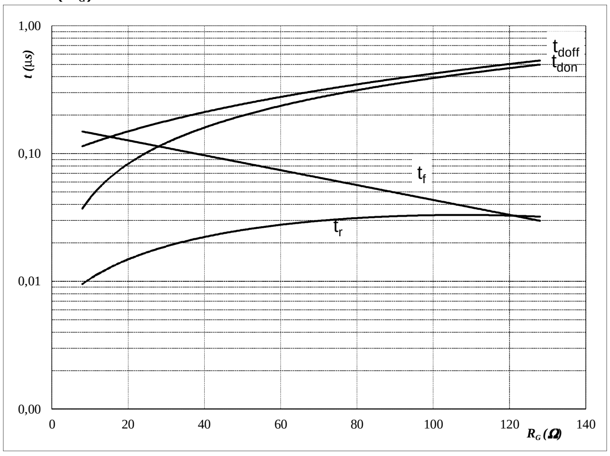
With an inductive load at

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

figure 10. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



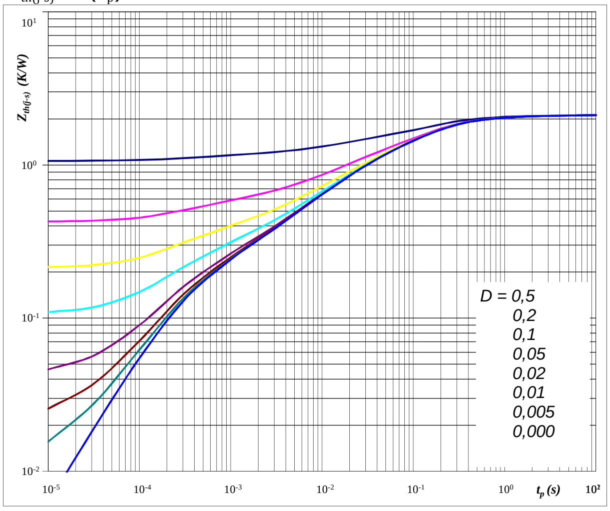
With an inductive load at

T_j =	125	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	20	A

figure 11. **IGBT**

IGBT transient thermal impedance as a function of pulse width

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

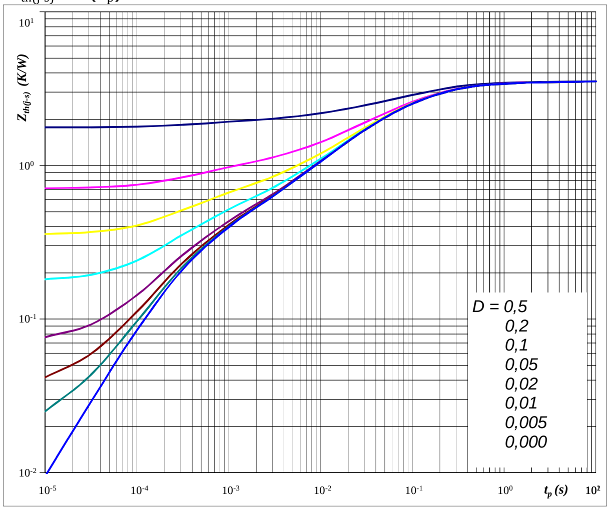


At	D =	t_p / T			
Thermal grease			Phase change material		
$R_{th(j-s)}$ =	2,12	K/W	$R_{th(j-s)}$ =	1,83	K/W

figure 12. **FWD**

FWD transient thermal impedance as a function of pulse width

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



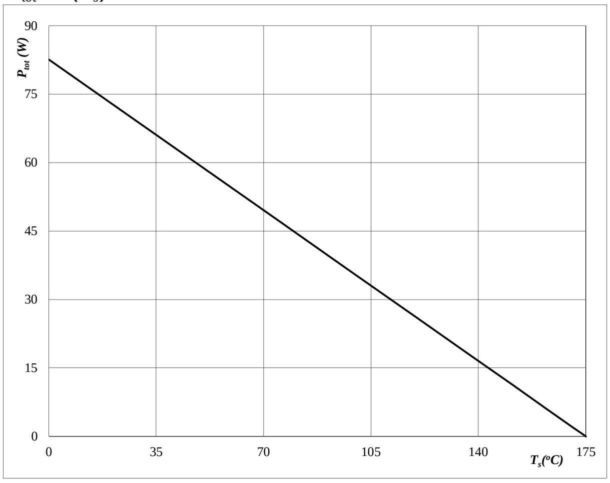
At	D =	t_p / T			
Thermal grease			Phase change material		
$R_{th(j-s)}$ =	3,53	K/W	$R_{th(j-s)}$ =	3,07	K/W

Brake

figure 13. **IGBT**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



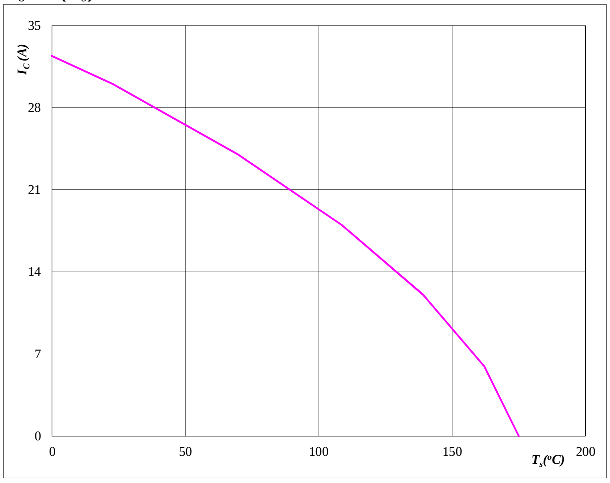
At

T_j = 175 ºC

figure 14. **IGBT**

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

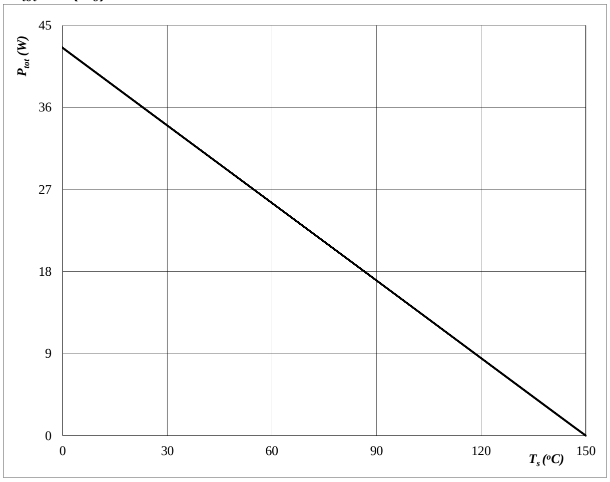
T_j = 175 ºC

V_{GE} = 15 V

figure 15. **FWD**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



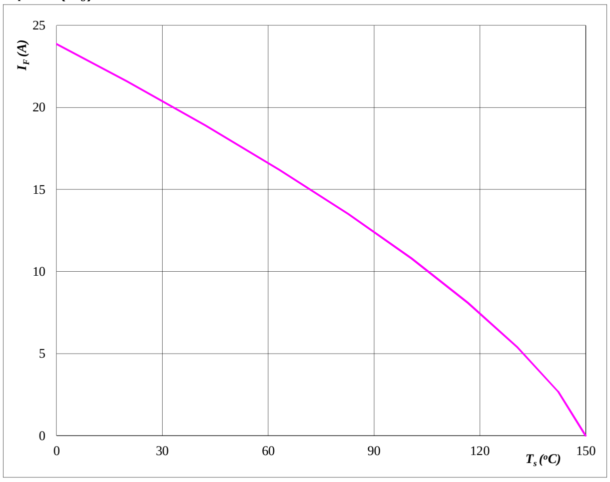
At

T_j = 150 ºC

figure 16. **FWD**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

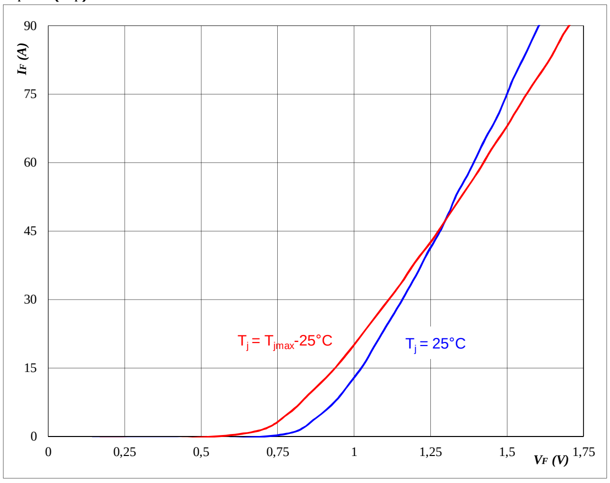
T_j = 150 ºC

Input Rectifier Bridge

figure 1. **Rectifier Diode**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



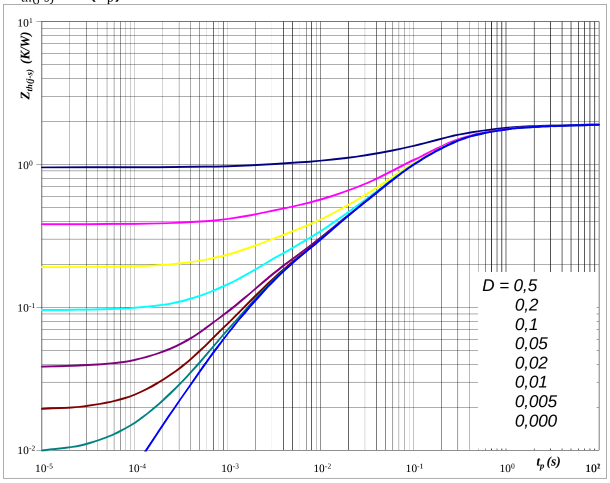
At

t_p = 250 µs

figure 2. **Rectifier Diode**

Diode transient thermal impedance as a function of pulse width

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



At

$D = t_p / T$

Thermal grease

$R_{th(j-s)}$ = 1,89 K/W

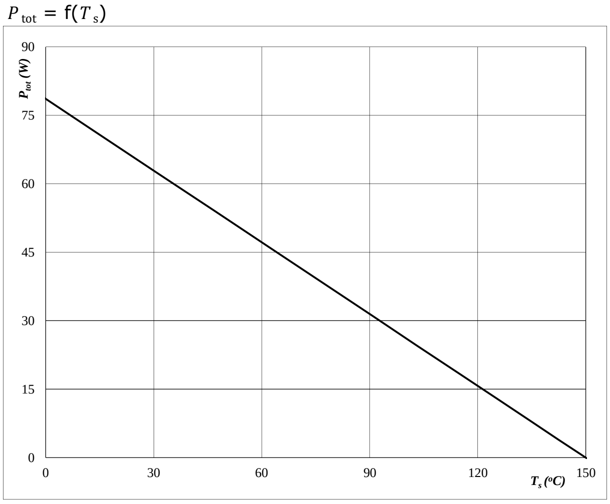
Phase change material

$R_{th(j-s)}$ = 1,62 K/W

figure 3. **Rectifier Diode**

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



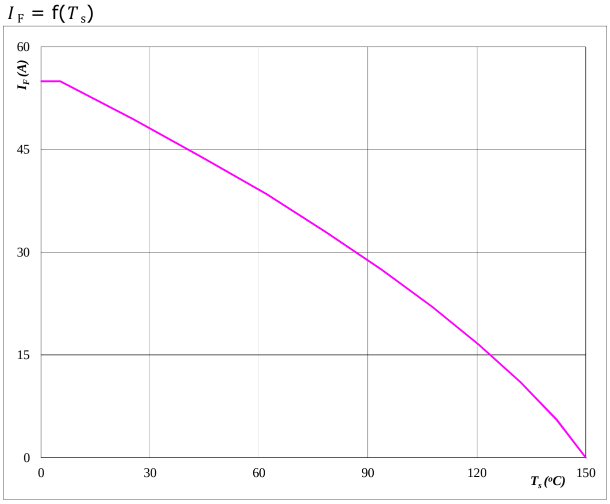
At

T_j = 150 ºC

figure 4. **Rectifier Diode**

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

T_j = 150 ºC

Thermistor

figure 1. **Thermistor**

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

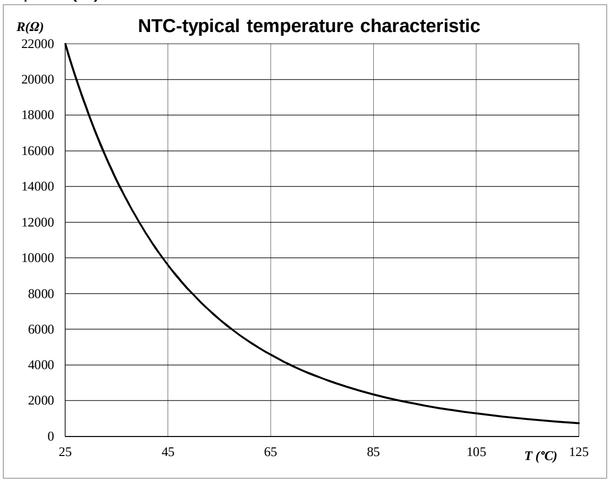


figure 2. **Thermistor**

Typical NTC resistance values

$$R(T) = R_{25} \cdot e^{\left(B_{25/100} \cdot \left(\frac{1}{T} - \frac{1}{T_{25}}\right)\right)} \quad [\Omega]$$

T [°C]	R_{nom} [Ω]	R_{min} [Ω]	R_{max} [Ω]	△R/R [±%]
-55	2089434,5	1506495,4	2672373,6	27,9
0	71804,2	59724,4	83884	16,8
10	43780,4	37094,4	50466,5	15,3
20	27484,6	23684,6	31284,7	13,8
25	22000	19109,3	24890,7	13,1
30	17723,3	15512,2	19934,4	12,5
60	5467,9	4980,6	5955,1	8,9
70	3848,6	3546	4151,1	7,9
80	2757,7	2568,2	2947,1	6,9
90	2008,9	1889,7	2128,2	5,9
100	**1486,1**	**1411,8**	**1560,4**	**5**
150	400,2	364,8	435,7	8,8

Vincotech

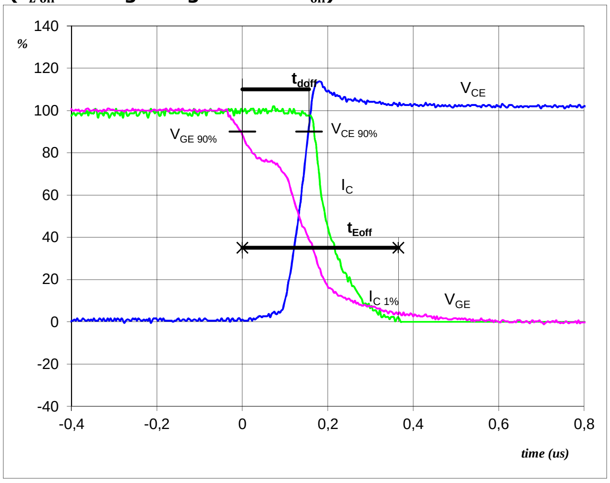
Switching Definitions Output Inverter

General conditions

T_j	=	125 °C
R_{gon}	=	4Ω
R_{goff}	=	4Ω

figure 1. **IGBT**

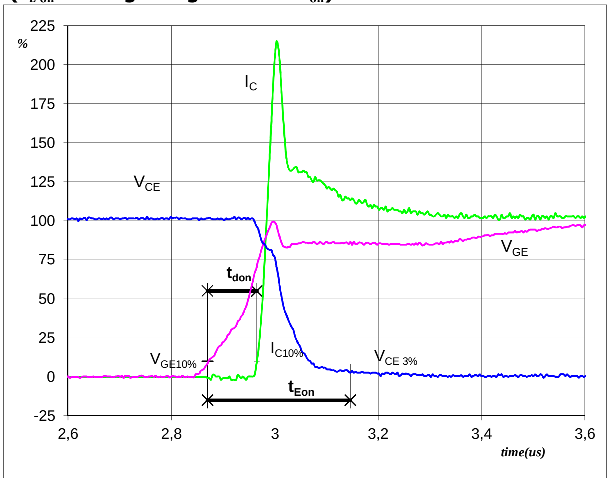
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} ($t_{E off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	30	A
t_{doff} =	0,16	µs
$t_{E off}$ =	0,37	µs

figure 2. **IGBT**

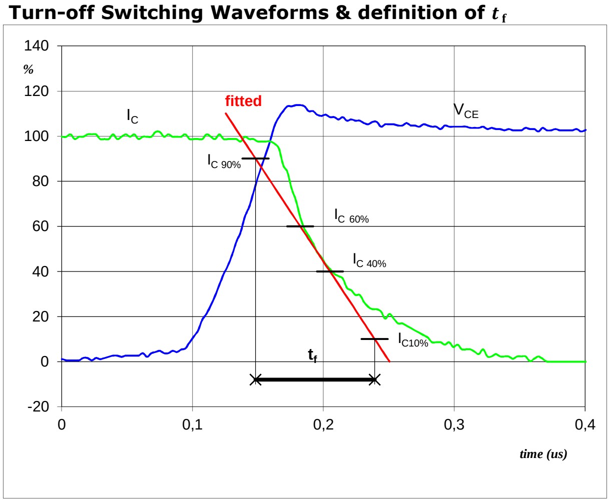
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} ($t_{E on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	30	A
t_{don} =	0,09	µs
$t_{E on}$ =	0,28	µs

figure 3. **IGBT**

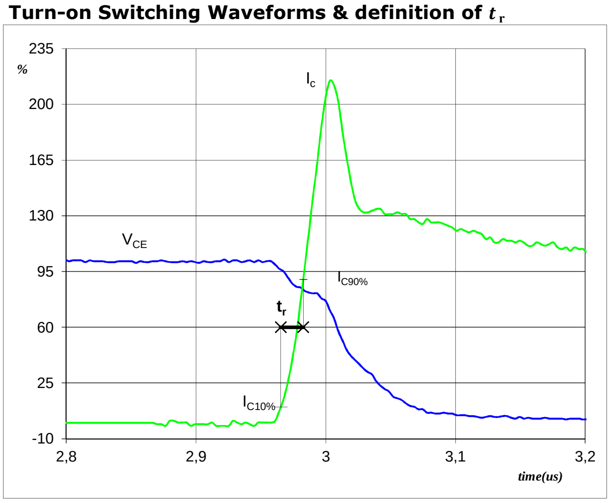
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	300	V
I_C (100%) =	30	A
t_f =	0,09	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

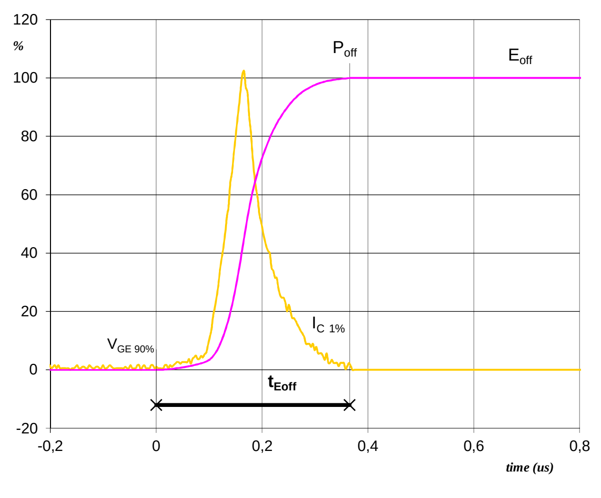


V_C (100%) =	300	V
I_C (100%) =	30	A
t_r =	0,02	µs

Switching Definitions Output Inverter

figure 5. **IGBT**

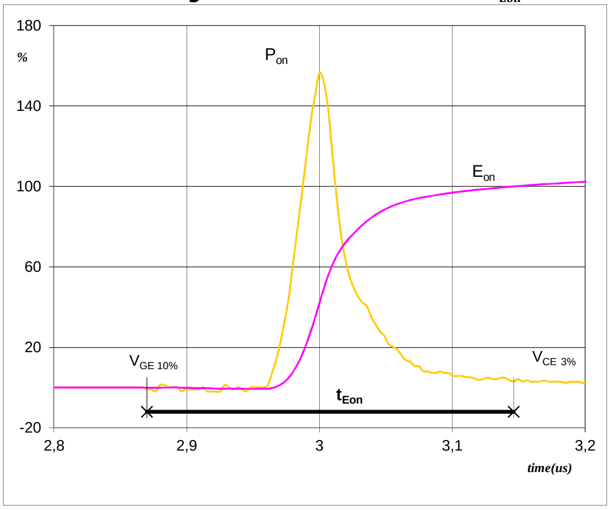
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	8,95	kW
E_{off} (100%) =	0,80	mJ
$t_{E\ off}$ =	0,37	μs

figure 6. **IGBT**

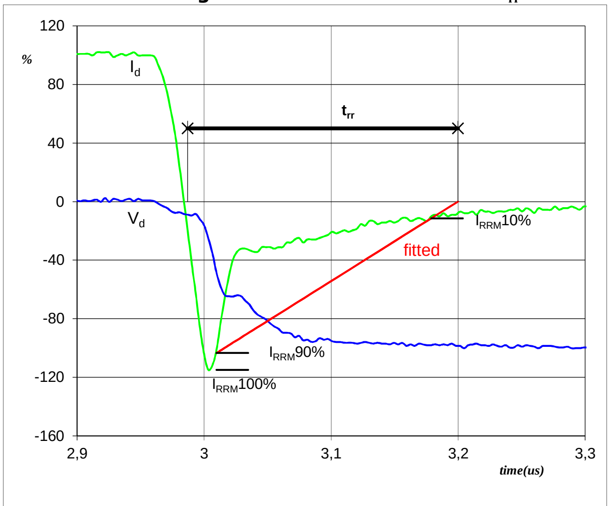
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	8,95	kW
E_{on} (100%) =	0,63	mJ
$t_{E\ on}$ =	0,28	μs

figure 7. **IGBT**

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

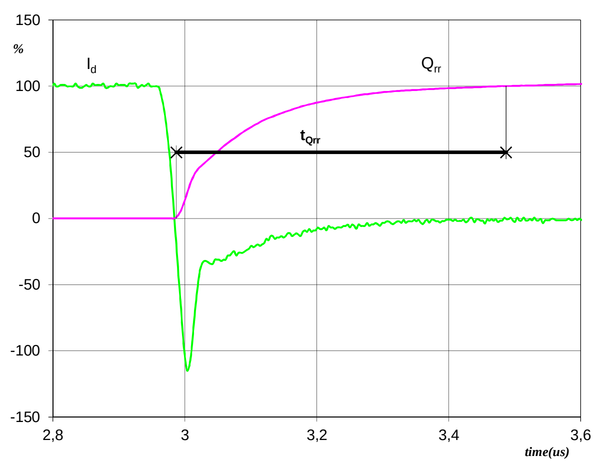


V_d (100%) =	300	V
I_d (100%) =	30	A
I_{RRM} (100%) =	34	A
t_{rr} =	0,18	μs

Switching Definitions Output Inverter

figure 8. **FWD**

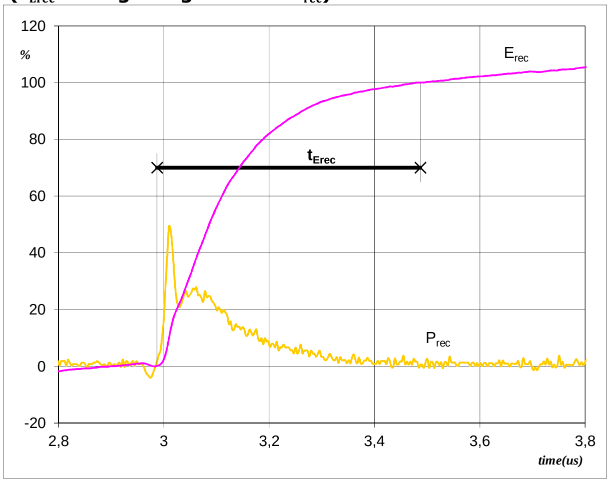
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	30	A
Q_{rr} (100%) =	2,16	µC
$t_{Q\,rr}$ =	0,50	µs

figure 9. **FWD**

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



P_{rec} (100%) =	8,95	kW
E_{rec} (100%) =	0,45	mJ
$t_{E\,rec}$ =	0,50	µs

Ordering Code & Marking

Version	Ordering Code
without thermal paste 17 mm housing with solder pins	V23990-P585-A20-PM
without thermal paste 17 mm housing with pressfit pins	V23990-P585-A20Y-PM
without thermal paste 12 mm housing with solder pins	V23990-P585-A208-PM
without thermal paste 12 mm housing with pressfit pins	V23990-P585-A208Y-PM
without thermal paste 12 mm 2 clips housing with solder pins	10-TY06PMA030SA-P585A206
without thermal paste 17 mm housing with solder pins	V23990-P585-C20-PM
without thermal paste 17 mm housing with pressfit pins	V23990-P585-C20Y-PM
with thermal paste 17 mm housing with solder pins	V23990-P585-A20-/3/-PM
with thermal paste 17 mm housing with pressfit pins	V23990-P585-A20Y-/3/-PM
with thermal paste 12 mm housing with solder pins	V23990-P585-A208-/3/-PM
with thermal paste 12 mm housing with pressfit pins	V23990-P585-A208Y-/3/-PM
with thermal paste 12 mm 2 clips housing with solder pins	10-TY06PMA030SA-P585A206
with thermal paste 17 mm housing with solder pins	V23990-P585-C20-/3/-PM
with thermal paste 17 mm housing with pressfit pins	V23990-P585-C20Y-/3/-PM

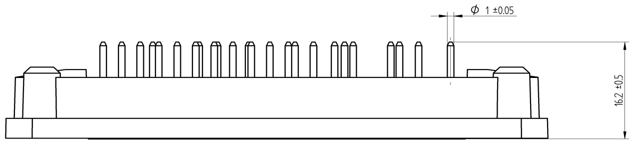
Text	VIN	Date code	Name&Ver	UL	Lot	Serial
	VIN	WWYY	NNNNNNVV	UL	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

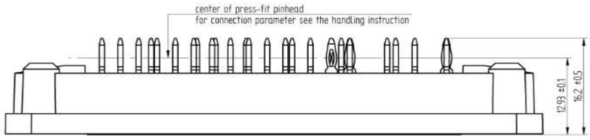
Pin table			
Pin	X	Y	Function
1	52,6	0	BrG
2	47,7	0	DC-
3	44,8	0	DC-
4	37,8	0	DC+
5	37,8	2,8	DC+
6	35	0	Inv+
7	35	2,8	Inv+
8	28	0	R1
9	25,2	0	R2
10	22,4	0	N6
11	19,6	0	G6
12	16,8	0	S6
13	14	0	N4
14	11,2	0	G4
15	8,4	0	S4
16	5,6	0	N2
17	2,8	0	G2
18	0	0	S2
19	0	28,5	U
20	2,8	28,5	G1
21	7,5	28,5	S1
22	14,5	28,5	V
23	17,3	28,5	G3
24	22	28,5	S3
25	29	28,5	W
26	31,8	28,5	G5
27	36,5	28,5	S5
28	43,5	28,5	L1
29	52,6	25	L2
30	52,6	16,9	L3
31	52,6	8,6	BrC
32	52,6	2,8	BrE

module	whitout pins
P585-C20	1, 31, 32
P585-C20Y	1, 31, 32

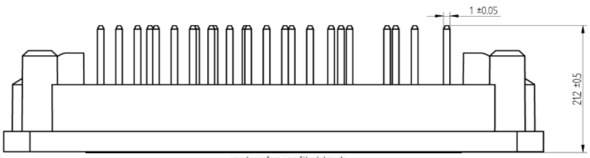
12 mm solder pin



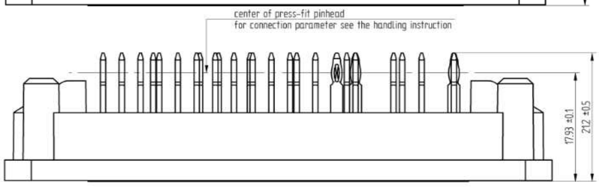
12 mm press-fit pin



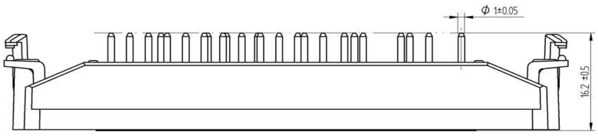
17 mm solder pin

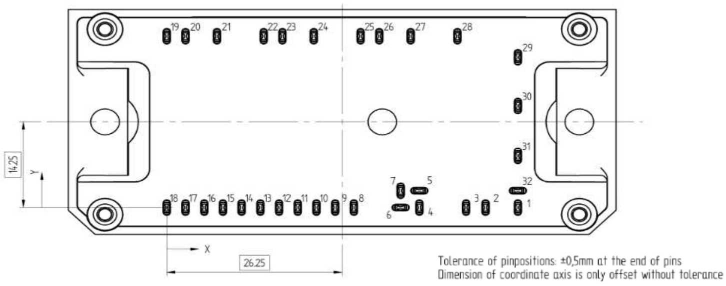


17 mm press-fit pin

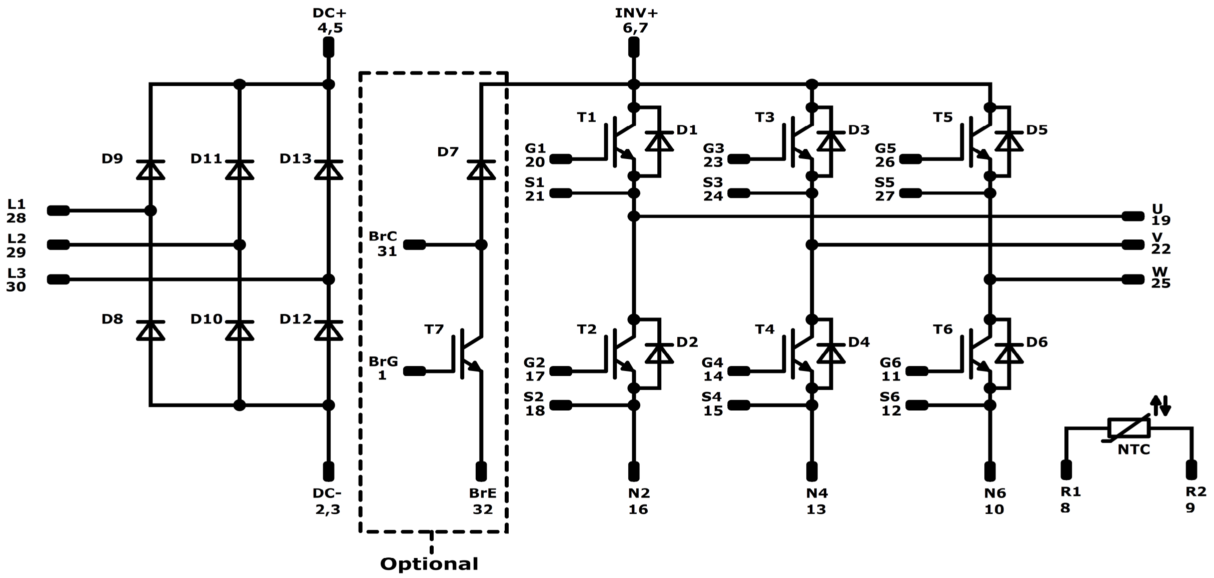


12mm solder pin / 2 clips





Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1,T2,T3,T4,T5,T6	IGBT	1200 V	30 A	Inverter Switch	
D1,D2,D3,D4,D5,D6	FWD	1200 V	30 A	Inverter Diode	
T7	IGBT	1200 V	20 A	Brake Switch	
D7	FWD	1200 V	20 A	Brake Diode	
D8,D9,D10,D11,D12,D13	Rectifier	1600 V	35 A	Rectifier Diode	
NTC	NTC			Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	**100**	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 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-P585-x2x-D6-14	29 Nov. 2019	2 clips type added	1, 23