

Features

- Trench/Fieldstop IGBT
- Low Switching Losses
- Standard package
- Copper Base Plate
- Solder Contact Technology
- Integrated NTC temperature sensor



Typical Applications

- Motor Drives
- Servo Drives

IGBT, Inverter

Maximum Rated Values						
Symbol	Item	Conditions	Rating			Unit
IGBT						
V_{CES}	Collector-emitter voltage	$T_{vj}=25^{\circ}\text{C}$	1200			V
V_{GES}	Gate-emitter voltage	-	± 20			V
I_C	Collector current,DC	$T_C=80^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	25			A
I_{CRM}	Repetitive peak collector current	$t_p=1\text{ms}$	50			A
P_{tot}	Total power dissipation	$T_C=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$	151			W
Characteristics Values						
Symbol	Item	Conditions	Values			Unit
IGBT						
I_{CES}	Collector-emitter cut-off current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$	Min.	Typ.	Max.	
I_{GES}	Gate leakage current	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_{vj}=25^{\circ}\text{C}$	-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=0.8\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$	5.2	5.6	6.6	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C=25\text{A}$	-	1.99	-	
		$V_{GE}=15\text{V}$	-	2.32	-	
			-	-	-	
C_{ies}	Input capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}$ $f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}$	-	1.77	-	nF
C_{oes}	Output capacitance		-	0.17	-	
C_{res}	Reverse transfer capacitance		-	0.06	-	
Q_G	Gate charge	$V_{CC}=600\text{V}, I_C=25\text{A}$ $V_{GE}=-15\dots+15\text{V}, T_{vj}=25^{\circ}\text{C}$	-	0.171	-	μC
R_g	Internal gate resistance	$T_{vj}=25^{\circ}\text{C}$	-	-	-	Ω

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=25A$ $V_{GE}=\pm 15V$ $R_{G(on)}=33\Omega$ $R_{G(off)}=33\Omega$	$T_{vj}=25^\circ C$	-	135	-	ns
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_r	Rise time		$T_{vj}=25^\circ C$	-	64	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	209.6	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_f	Fall time		$T_{vj}=25^\circ C$	-	267.2	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
E_{on}	Turn-on energy (per pulse)	$T_{vj}=25^\circ C$	-	4.9	-	mJ	
		$T_{vj}=125^\circ C$	-	-	-		
		$T_{vj}=150^\circ C$	-	-	-		
E_{off}	Turn-off energy (per pulse)	$T_{vj}=25^\circ C$	-	1.7	-		
		$T_{vj}=125^\circ C$	-	-	-		
		$T_{vj}=150^\circ C$	-	-	-		
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^\circ C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	90	-	A	
R_{thJC}	Thermal resistance, junction to case	Per IGBT			0.99	K/W	
T_{vjop}	Temperature under switching conditions		-40		150	$^\circ C$	

Diode, Inverter
Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^\circ C$	1200	V
I_F	Forward current, DC	$T_C=80^\circ C, T_{vj}=175^\circ C$	25	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	50	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=125^\circ C$	170	A^2s

Characteristic Values

			Min.	Typ.	Max.		
V_F	Continuous forward voltage	$I_F=25A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	2.25	-	V
			$T_{vj}=125^\circ C$	-	1.94	-	
			$T_{vj}=150^\circ C$	-	-	-	
I_{RM}	Peak reverse recovery current	$V_R=600V$ $I_F=25A$ $V_{GE}=-15V$	$T_{vj}=25^\circ C$	-	50	-	A
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_{rr}	Reverse recovery time		$T_{vj}=25^\circ C$	-	263	-	ns
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
Q_r	Recovered charge	$T_{vj}=25^\circ C$	-	0.9	-	μC	
		$T_{vj}=125^\circ C$	-	-	-		
		$T_{vj}=150^\circ C$	-	-	-		
E_{rec}	Reverse recovery energy			0.16	-	mJ	

			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
R_{thJC}	Thermal resistance, junction to case	Per diode		-	-	1.35	K/W
T_{vjop}	Temperature under switching conditions			-40		150	$^{\circ}\text{C}$

Diode, Rectifier

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$		1800			V
I_{FRMSM}	Maximum RMS forward current per chip	$T_C=80^{\circ}\text{C}$		50			A
I_{RMSM}	Maximum RMS current at rectifier output	$T_C=80^{\circ}\text{C}$		80			A
I^2t	I^2t -value	$t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$		340			A^2s
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			Min.	Typ.	Max.		
V_F	Continuous forward voltage	$I_F=25\text{A}$ $V_{GE}=0\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	1.1	-	V
			$T_{vj}=125^{\circ}\text{C}$	-	1.07	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
I_R	Reverse current	$V_R=1800\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	-	10	uA
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
T_{vjop}	Temperature under switching conditions			-40		150	$^{\circ}\text{C}$

IGBT, Brake-Chopper

Maximum Rated Values							
Symbol	Item	Conditions		Values			Unit
V_{CES}	Collector-emitter voltage	$T_{vj}=25^{\circ}\text{C}$		1200			V
V_{GES}	Gate-emitter voltage	-		± 20			V
I_C	Collector current, DC	$T_C=100^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$		15			A
I_{CRM}	Repetitive peak collector current	$t_p=1\text{ms}$		30			A
P_{tot}	Total power dissipation	$T_C=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$		127			W
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			Min.	Typ.	Max.		
IGBT							
I_{CES}	Collector-emitter cut-off current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$		-	-	1	mA
I_{GES}	Gate leakage current	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_{vj}=25^{\circ}\text{C}$		-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=0.5\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$		5.2	5.85	6.6	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C=15\text{A}$ $V_{GE}=15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	1.94	2.25	
			$T_{vj}=125^{\circ}\text{C}$	-	2.24	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	

C_{ies}	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$	-	1.19	-	nF	
C_{oes}	Output capacitance		-	0.08	-		
C_{res}	Reverse transfer capacitance		-	0.04	-		
Q_G	Gate charge	$V_{CC}=600V, I_C=15A$ $V_{GE}=-15...+15V, T_{vj}=25^{\circ}C$	-	0.094	-	μC	
R_g	Internal gate resistance	$T_{vj}=25^{\circ}C$	-	-	-	Ω	
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=15A$ $V_{GE}=\pm 15V$ $R_{G(on)}=33\Omega$ $R_{G(off)}=33\Omega$	$T_{vj}=25^{\circ}C$	-	130	-	ns
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
t_r	Rise time		$T_{vj}=25^{\circ}C$	-	47	-	
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^{\circ}C$	-	124	-	
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
t_f	Fall time		$T_{vj}=25^{\circ}C$	-	336	-	
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
E_{on}	Turn-on energy (per pulse)	$T_{vj}=25^{\circ}C$	-	2.5	-	mJ	
		$T_{vj}=125^{\circ}C$	-	-	-		
		$T_{vj}=150^{\circ}C$	-	-	-		
E_{off}	Turn-off energy (per pulse)	$T_{vj}=25^{\circ}C$	-	1	-		
		$T_{vj}=125^{\circ}C$	-	-	-		
		$T_{vj}=150^{\circ}C$	-	-	-		
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^{\circ}C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	55	-	A	
R_{thJC}	Thermal resistance, junction to case	Per IGBT			1.18	K/W	
T_{vjop}	Temperature under switching conditions		-40		150	$^{\circ}C$	

Diode, Brake-Chopper
Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	1200	V
I_F	Forward current, DC	$T_C=80^{\circ}C, T_{vj}=175^{\circ}C$	10	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	20	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	20	A^2s

Characteristic Values

			Min.	Typ.	Max.		
V_F	Continuous forward voltage	$I_F=10A$ $V_{GE}=0V$	$T_{vj}=25^{\circ}C$	-	2.12	2.3	V
			$T_{vj}=125^{\circ}C$	-	1.86	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
I_{RM}	Peak reverse recovery current	$V_R=600V$ $I_F=15A$ $V_{GE}=-15V$	$T_{vj}=25^{\circ}C$	-	20	-	A
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
t_{rr}	Reverse recovery time		$T_{vj}=25^{\circ}C$	-	502	-	ns

			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
Q_r	Recovered charge		$T_{vj}=25^{\circ}\text{C}$	-	1.2	-	μC
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
E_{rec}	Reverse recovery energy		$T_{vj}=25^{\circ}\text{C}$	-	0.32	-	mJ
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
R_{thJC}	Thermal resistance, junction to case	Per diode	-	-	-	2.3	K/W
T_{vjop}	Temperature under switching conditions			-40		150	$^{\circ}\text{C}$

Note:

IGBT electrical characteristics according to IEC 60747 – 9

Diode electrical characteristics according to IEC 60747 – 2

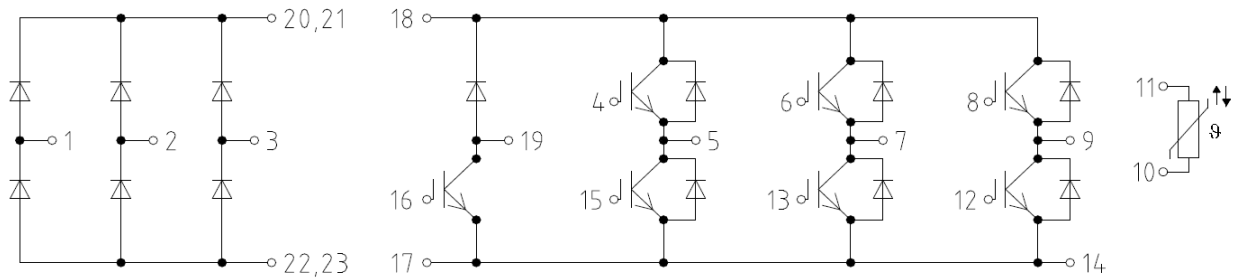
NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	$T_C=25^{\circ}\text{C}$	-	5	-	$\text{k}\Omega$
$\Delta R/R$	Deviation of resistance	$T_C=100^{\circ}\text{C}, R_{100}=493\Omega$	-5	-	5	%
P_{25}	Power dissipation	$T_C=25^{\circ}\text{C}$	-	-	20	mW
$B_{25/50}$	B-constant	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$	-	3375	-	K
$B_{25/80}$	B-constant	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15\text{K}))]$	-	3411	-	
$B_{25/100}$	B-constant	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15\text{K}))]$	-	3433	-	

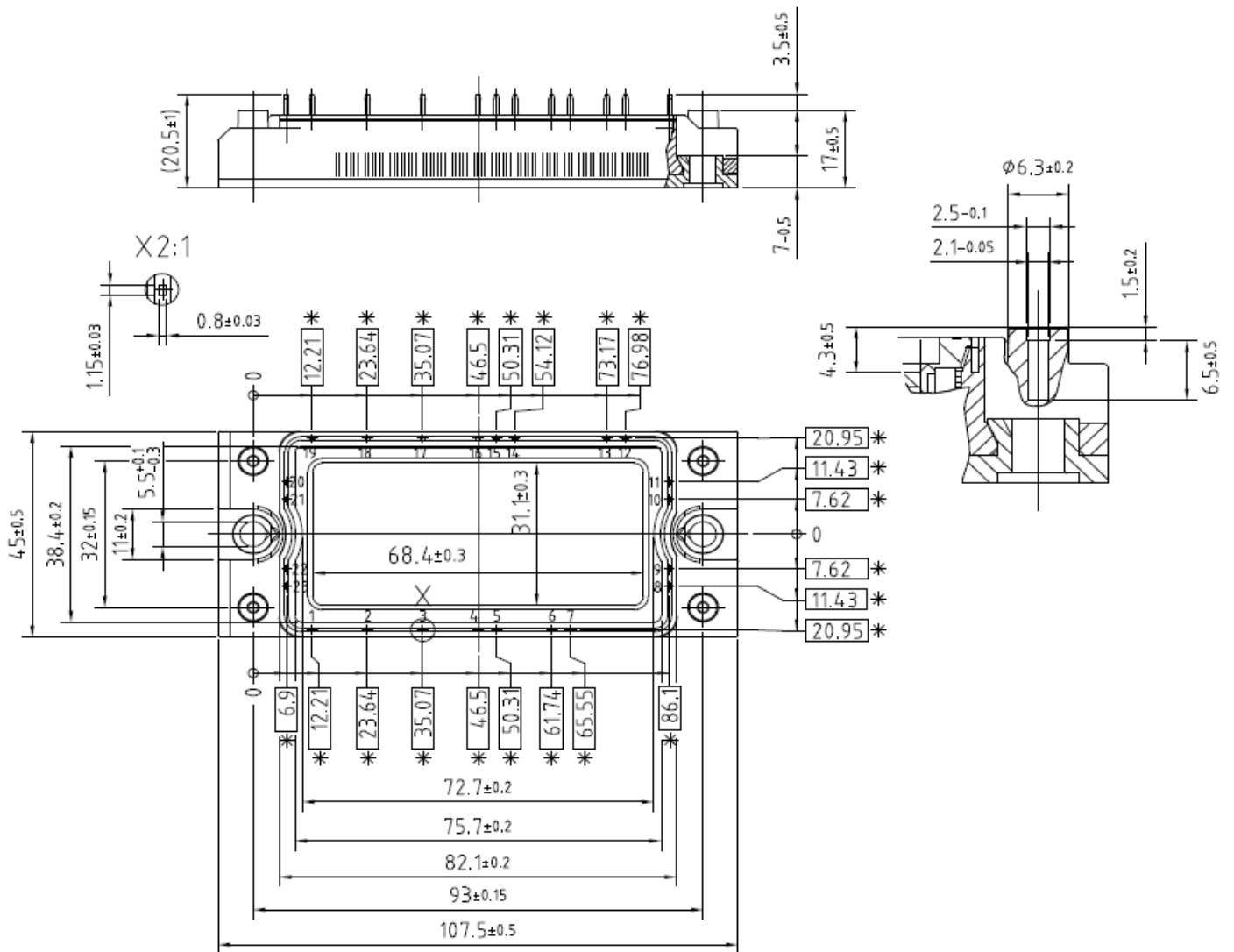
Module

Symbol	Item	Conditions	Rating			Unit
V_{ISOL}	Isolation voltage	Terminals to baseplate, RMS, $f=50\text{Hz}, t=1\text{min}$	2500			V
$T_{vj\max}$	Maximum junction temperature	-	175			$^{\circ}\text{C}$
T_{vjop}	Operating junction temperature	Continuous operation (under switching)	-40~150			$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40~125			$^{\circ}\text{C}$
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M_s	Mounting torque	Mounting to heat sink, M5 screw	3	-	6	Nm
d_s	Creepage distance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	10	-	
d_a	Clearance	Terminal to terminal	-	-	-	mm
		Terminal to base plate	-	7.5	-	
m	Weight	-	-	175	-	g

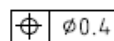
Circuit Diagram



Package Outlines



* = alle Maße mit einer Toleranz von
 * = all dimensions with tolerance of



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