

### Features

- Trench/Fieldstop IGBT
- Half-bridge
- Low inductance
- Standard package
- High short circuit capability
- Including anti-parallel FWD



### Typical Applications

- Motor Drives
- Servo Drives
- Auxiliary Inverters

### IGBT, Inverter

Maximum Rated Values						
Symbol	Item	Conditions	Rating	Unit		
IGBT						
$V_{CES}$	Collector-emitter voltage	$T_{vj}=25^{\circ}C$	1200	V		
$V_{GES}$	Gate-emitter voltage	-	$\pm 20$	V		
$I_C$	Collector current,DC	$T_C=80^{\circ}C, T_{vj}=175^{\circ}C$	40	A		
$I_{CRM}$	Repetitive peak collector current	$t_p=1ms$	80	A		
$P_{tot}$	Total power dissipation	$T_C=25^{\circ}C, T_{vj}=175^{\circ}C$	250	W		
Characteristics Values						
Symbol	Item	Conditions	Values			Unit
IGBT			Min.	Typ.	Max.	
$I_{CES}$	Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$	-	-	1	mA
$I_{GES}$	Gate leakage current	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$	-	-	100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=0.8mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}C$	5.2	5.6	6.6	V
$V_{CEsat}$	Collector-emitter saturation voltage	$I_C=40A$ $V_{GE}=15V$ $T_{vj}=25^{\circ}C$	-	2.23	-	
		$T_{vj}=125^{\circ}C$	-	-	-	
		$T_{vj}=150^{\circ}C$	-	-	-	
$C_{ies}$	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$	-	1.77	-	nF
$C_{oes}$	Output capacitance		-	0.17	-	
$C_{res}$	Reverse transfer capacitance		-	0.06	-	
$Q_G$	Gate charge	$V_{CC}=600V, I_C=25A$ $V_{GE}=-15...+15V, T_{vj}=25^{\circ}C$	-	171	-	nC
$R_g$	Internal gate resistance	$T_{vj}=25^{\circ}C$	-	-	-	$\Omega$

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=25A$ $V_{GE}=\pm 15V$ $R_{G(on)}=51\Omega$ $R_{G(off)}=51\Omega$	$T_{vj}=25^\circ C$	-	203	-	ns
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_r$	Rise time		$T_{vj}=25^\circ C$	-	74	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	439	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_f$	Fall time		$T_{vj}=25^\circ C$	-	219	-	
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$E_{on}$	Turn-on energy (per pulse)	$T_{vj}=25^\circ C$	-	10.1	-	mJ	
		$T_{vj}=125^\circ C$	-	-	-		
		$T_{vj}=150^\circ C$	-	-	-		
$E_{off}$	Turn-off energy (per pulse)	$T_{vj}=25^\circ C$	-	2.3	-		
		$T_{vj}=125^\circ C$	-	-	-		
		$T_{vj}=150^\circ C$	-	-	-		
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^\circ C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	180	-	A	
$T_{vjop}$	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	$T_C=80^\circ C, T_{vj}=175^\circ C$	40	A
$I_{FRM}$	Repetitive peak forward current	$t_p=1ms$	80	A
$I^2t$	$I^2t$ -value	$V_R=0V, t_p=10ms, T_{vj}=125^\circ C$	320	$A^2s$

**Characteristic Values**

			Min.	Typ.	Max.		
$V_F$	Continuous forward voltage	$I_F=40A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	2.21	-	V
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$I_{RM}$	Peak reverse recovery current	$V_R=600V$ $I_F=40A$ $V_{GE}=-15V$	$T_{vj}=25^\circ C$	-	18	-	A
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_{rr}$	Reverse recovery time		$T_{vj}=25^\circ C$	-	308	-	ns
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$Q_r$	Recovered charge		$T_{vj}=25^\circ C$	-	2.59	-	$\mu C$
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
$E_{rec}$	Reverse recovery energy	$T_{vj}=25^\circ C$	-	0.92	-	mJ	
		$T_{vj}=125^\circ C$	-	-	-		

			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
$T_{vjop}$	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	$T_{vj}=25^{\circ}\text{C}$		1600			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	$T_C=80^{\circ}\text{C}$		60			A
$I_{FSM}$	Surge forward current	$t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$		350			A
$I^2t$	$I^2t$ -value	$t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$		605			$\text{A}^2\text{s}$

Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			Min.	Typ.	Max.		
$V_F$	Continuous forward voltage	$I_F=40\text{A}$ $V_{GE}=0\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	1.26	-	V
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
$I_R$	Reverse current	$V_R=1600\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	-	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	-		$\pm 20$			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	$T_C=25^{\circ}\text{C}, T_{vj}=175^{\circ}\text{C}$		125			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	$I_C=0.5\text{mA}, V_{CE}=V_{GE}, T_{vj}=25^{\circ}\text{C}$		5.7	6.2	6.7	
$V_{CESat}$	Collector-emitter saturation voltage	$I_C=15\text{A}$ $V_{GE}=15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	-	2.05	-	V
			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
			$T_{vj}=150^{\circ}\text{C}$	-	-	-	
$C_{ies}$	Input capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}$ $f=1\text{MHz}, T_{vj}=25^{\circ}\text{C}$		-	1.19	-	nF
$C_{oes}$	Output capacitance			-	0.08	-	
$C_{res}$	Reverse transfer capacitance			-	0.04	-	

Q <sub>G</sub>	Gate charge	V <sub>CC</sub> =600V, I <sub>C</sub> =15A V <sub>GE</sub> =-15...+15V, T <sub>vj</sub> =25°C	-	94	-	nC
R <sub>g</sub>	Internal gate resistance	T <sub>vj</sub> =25°C	-	-	-	Ω
t <sub>d(on)</sub>	Turn-on delay time	V <sub>CC</sub> =600V I <sub>C</sub> =15A V <sub>GE</sub> =±15V R <sub>G(on)</sub> =51Ω R <sub>G(off)</sub> =51Ω	T <sub>vj</sub> =25°C	-	124	-
t <sub>r</sub>	Rise time		T <sub>vj</sub> =125°C	-	-	-
			T <sub>vj</sub> =150°C	-	-	-
			T <sub>vj</sub> =25°C	-	148	-
t <sub>d(off)</sub>	Turn-off delay time		T <sub>vj</sub> =125°C	-	-	-
			T <sub>vj</sub> =150°C	-	-	-
			T <sub>vj</sub> =25°C	-	173	-
t <sub>f</sub>	Fall time		T <sub>vj</sub> =125°C	-	-	-
			T <sub>vj</sub> =150°C	-	-	-
			T <sub>vj</sub> =25°C	-	299	-
E <sub>on</sub>	Turn-on energy (per pulse)		T <sub>vj</sub> =25°C	-	4	-
			T <sub>vj</sub> =125°C	-	-	-
		T <sub>vj</sub> =150°C	-	-	-	
E <sub>off</sub>	Turn-off energy (per pulse)	T <sub>vj</sub> =25°C	-	0.94	-	
		T <sub>vj</sub> =125°C	-	-	-	
		T <sub>vj</sub> =150°C	-	-	-	
SC data	Short-circuit current	V <sub>CC</sub> =600V, V <sub>GE</sub> ≤15V, T <sub>vj</sub> =125°C V <sub>CES</sub> ≤1200V, t <sub>p</sub> ≤10μs	-	60	-	A
T <sub>vjop</sub>	Temperature under switching conditions		-40		150	°C

**Diode, Brake-Chopper**
**Maximum Rated Values**

Symbol	Item	Conditions	Rating	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage	T <sub>vj</sub> =25°C	1200	V
I <sub>F</sub>	Forward current, DC	T <sub>C</sub> =80°C, T <sub>vj</sub> =175°C	10	A
I <sub>FRM</sub>	Repetitive peak forward current	t <sub>p</sub> =1ms	20	A
I <sup>2</sup> t	I <sup>2</sup> t-value	V <sub>R</sub> =0V, t <sub>p</sub> =10ms, T <sub>vj</sub> =125°C	20	A <sup>2</sup> s

**Characteristic Values**

			Min.	Typ.	Max.	
V <sub>F</sub>	Continuous forward voltage	I <sub>F</sub> =10A V <sub>GE</sub> =0V	T <sub>vj</sub> =25°C	-	2.05	-
			T <sub>vj</sub> =125°C	-	-	-
			T <sub>vj</sub> =150°C	-	-	-
I <sub>RM</sub>	Peak reverse recovery current	V <sub>R</sub> =600V I <sub>F</sub> =10A V <sub>GE</sub> =-15V	T <sub>vj</sub> =25°C	-	5.5	-
			T <sub>vj</sub> =125°C	-	-	-
			T <sub>vj</sub> =150°C	-	-	-
t <sub>rr</sub>	Reverse recovery time	V <sub>R</sub> =600V I <sub>F</sub> =10A V <sub>GE</sub> =-15V	T <sub>vj</sub> =25°C	-	942	-
			T <sub>vj</sub> =125°C	-	-	-
Q <sub>r</sub>	Recovered charge	V <sub>R</sub> =600V I <sub>F</sub> =10A V <sub>GE</sub> =-15V	T <sub>vj</sub> =25°C	-	2.5	-
			T <sub>vj</sub> =125°C	-	-	-
E <sub>rec</sub>	Reverse recovery energy	V <sub>R</sub> =600V I <sub>F</sub> =10A V <sub>GE</sub> =-15V	T <sub>vj</sub> =25°C	-	0.88	-

			$T_{vj}=125^{\circ}\text{C}$	-	-	-	
$T_{vjop}$	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

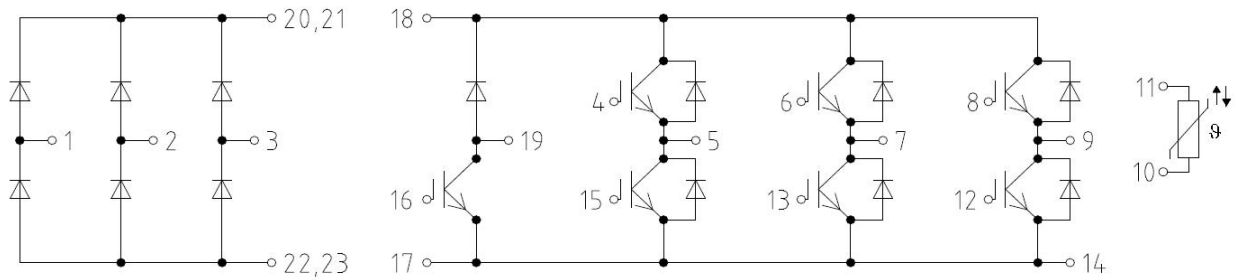
### NTC Thermistor Characteristics

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	-	

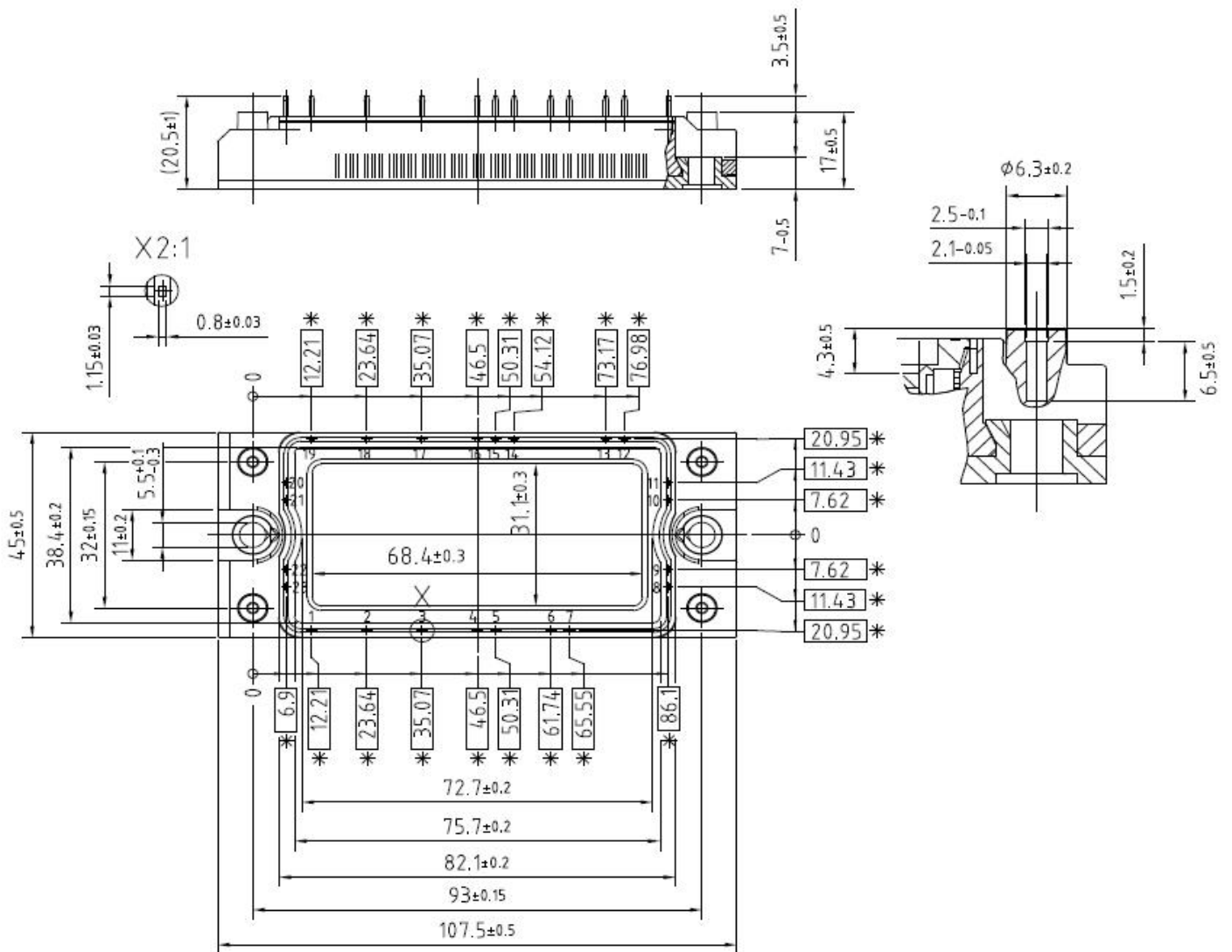
### Module

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			$^{\circ}\text{C}$
$T_{vj\ op}$	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	-	-	180	-	g

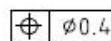
**Circuit Diagram**



**Package Outlines**



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



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