

Electrical Features

- Low Switching Losses
- Trench/Fieldstop IGBT
- V_{CEsat} with positive Temperature Coefficient
- Low V_{CEsat}

Typical Applications

- Auxiliary Inverters
- Air Conditioning
- Motor Drives



Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- Compact design
- Solder Contact Technology
- Rugged mounting due to integrated mounting clamps

IGBT, Inverter

Maximum Rated Values							
Symbol	Item	Conditions		Rating		Unit	
IGBT							
V _{CES}	Collector-emitter voltage	T _{vj} =25°C		1200		V	
V _{GES}	Gate-emitter voltage	-		±20		V	
I _C	Collector current,DC	T _C =100°C,T _{vj} =175°C		40		A	
I _{CRM}	Repetitive peak collector current	t _p =1ms		80		A	
P _{tot}	Total power dissipation	T _C =25°C,T _{vj} =175°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°C		-	-	1	mA
I _{GES}	Gate leakage current	V _{CE} =0V,V _{GE} =20V,T _{vj} =25°C		-	-	500	nA
V _{GE(th)}	Gate-emitter threshold voltage	I _C =1.5mA,V _{CE} =V _{GE} ,T _{vj} =25°C		5.2	6.08	6.5	V
V _{CESat}	Collector-emitter saturation voltage	I _C =40A V _{GE} =15V	T _{vj} =25°C	-	1.9	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
C _{ies}	Input capacitance	V _{CE} =25V,V _{GE} =0V f=1MHz,T _{vj} =25°C		-	3.13	-	nF
C _{oes}	Output capacitance			-	0.17	-	
C _{res}	Reverse transfer capacitance			-	0.09	-	
Q _G	Gate charge	V _{GE} =-15...+15V,T _{vj} =25°C		-	240	-	uC
R _g	Internal gate resistance	T _{vj} =25°C		-	0	-	Ω

t _{d(on)}	Turn-on delay time	V _{CC} =600V I _C =40A V _{GE} =±15V R _{G(on)} =12Ω R _{G(off)} =12Ω	T _{vj} =25°C	-	10	-	ns
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _r	Rise time		T _{vj} =25°C	-	25	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{d(off)}	Turn-off delay time		T _{vj} =25°C	-	204	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _f	Fall time		T _{vj} =25°C	-	230	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{on}	Turn-on energy (per pulse)		T _{vj} =25°C	-	2.41	-	mJ
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{off}	Turn-off energy (per pulse)		T _{vj} =25°C	-	2.45	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
SC data	Short-circuit current	V _{CC} =600V,V _{GE} ≤15V,T _{vj} =150°C V _{CES} ≤1200V,t _p ≤10μs	-	242.5	-	A	
R _{thJC}	Thermal resistance,junction to case	Per IGBT	-	-	0.6	K/W	
R _{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1 W/(m·K)	-	-	-	K/W	
T _{vjop}	Temperature under switching conditions		-40		150	°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		35	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	70	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	220	A^2s

Characteristic Values

Characteristics Values							
V _F	Continuous forward voltage	I _F =35A V _{GE} =0V	T _{vj} =25°C	-	2.24	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
I _{RM}	Peak reverse recovery current	V _R =600V I _F =40A V _{GE} =-15V	T _{vj} =25°C	-	70	-	A
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	57.4	-	ns
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
Q _r	Repetitive peak forward current		T _{vj} =25°C	-	2.47	-	μC
			T _{vj} =125°C	-	-	-	
			T _{vi} =150°C	-	-	-	

E _{rec}	Recovered charge		T _{vj} =25°C	-	1.47	-	mJ
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
R _{thJC}	Thermal resistance, junction to case	per diode		-	-	0.90	K/W
R _{thCH}	Thermal resistance, case to heatsink	per diode, $\lambda_{\text{grease}}=1 \text{ W/(m} \cdot \text{K)}$		-	-	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C

Diode, Rectifier

Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
V _{RRM}	Repetitive peak reverse voltage	T _{vj} =25°C		1600			V
I _{FRMSM}	Maximum RMS forward current per chip	T _C =80°C,T _{vj} =175°C		60			A
I _{RMSM}	Maximum RMS current at rectifier output	T _C = 80°C		60			A
I _{FSM}	Surge forward current	tp = 10 ms, Tvj = 150° C		370			A
I²t	I²t-value	V _R =0V,t _p =10ms,T _{vj} =150°C		685			A²s
Characteristic Values							
Symbol	Item	Conditions		Values			Unit
				Min.	Typ.	Max.	
V _F	Continuous forward voltage	I _F =35A V _{GE} =0V	T _{vj} =25°C	-	1.57	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
I _R	Reverse current	V _R =1600V	T _{vj} =25°C	-	0.1	-	mA
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
R _{thJC}	Thermal resistance, junction to case	per diode		-	1.05	1.15	K/W
R _{thCH}	Thermal resistance, case to heatsink	per diode, λ _{grease} =1 W/(m • K)		-	0.95	-	K/W
Tvjop	Temperature under switching conditions			-40		150	°C

IGBT, Brake-Chopper

Maximum Rated Values						
Symbol	Item	Conditions	Values			Unit
V _{CES}	Collector-emitter voltage	T _{vj} =25°C	1200			V
V _{GES}	Gate-emitter voltage	-	±20			V
I _C	Collector current,DC	T _C =100°C,T _{vj} =175°C	35			A
I _{CRM}	Repetitive peak collector current	t _p =1ms	70			A
P _{tot}	Total power dissipation	T _C =25°C,T _{vj} =175°C	214			W
Characteristic 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°C	-	-	1	mA
I _{GES}	Gate leakage current	V _{CE} =0V,V _{GE} =20V,T _{vj} =25°C	-	-	500	nA

V _{GE(th)}	Gate-emitter threshold voltage	I _C =0.8mA,V _{CE} =V _{GE} ,T _{vj} =25°C		5.2	5.7	6.5	V
V _{CEsat}	Collector-emitter saturation voltage	I _C =35A V _{GE} =15V	T _{vj} =25°C	-	2.47	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
C _{ies}	Input capacitance	V _{CE} =25V,V _{GE} =0V f=1MHz,T _{vj} =25°C		-	1767	-	pF
C _{oes}	Output capacitance			-	116	-	
C _{res}	Reverse transfer capacitance			-	62	-	
Q _G	Gate charge	V _{CC} =600V,I _C =35A V _{GE} =-15...+15V,T _{vj} =25°C		-	171	-	nC
R _g	Internal gate resistance	T _{vj} =25°C		-	0	-	Ω
t _{d(on)}	Turn-on delay time		T _{vj} =25°C	-	109	-	ns
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _r	Rise time		T _{vj} =25°C	-	10.4	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{d(off)}	Turn-off delay time		T _{vj} =25°C	-	166	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _f	Fall time		T _{vj} =25°C	-	239	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{on}	Turn-on energy (per pulse)		T _{vj} =25°C	-	1.57	-	mJ
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
E _{off}	Turn-off energy (per pulse)		T _{vj} =25°C	-	1.28	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
SC data	Short-circuit current	V _{CC} =600V,V _{GE} ≤15V,T _{vj} =150°C V _{CES} ≤1200V,t _p ≤10μs		-	160	-	A
R _{thJC}	Thermal resistance,junction to case	Per IGBT		-	0.6	0.7	K/W
R _{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	0.6	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C
Diode, Brake-Chopper							
Maximum Rated Values							
Symbol	Item	Conditions		Rating		Unit	
V _{RRM}	Repetitive peak reverse voltage	T _{vj} =25°C		1200		V	
I _F	Forward current,DC			10		A	
I _{FRM}	Repetitive peak forward current	t _p =1ms		20		A	
I ² t	I ² t-value	V _R =0V,t _p =10ms,T _{vj} =125°C		16		A ² s	
Characteristic Values							
V _F	Continuous forward voltage	I _F =10A V _{GE} =0V	T _{vj} =25°C	-	1.98	-	V
			T _{vj} =125°C	-	-	-	

			T _{vj} =150°C	-	-	-	
I _{RM}	Peak reverse recovery current	V _R =600V I _F =10A V _{GE} =-15V	T _{vj} =25°C	-	45	-	A
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	45.2	-	ns
			T _{vj} =125°C	-	-	-	
Q _r	Repetitive peak forward current		T _{vj} =25°C	-	1.06	-	μC
			T _{vj} =125°C	-	-	-	
E _{rec}	Recovered charge		T _{vj} =25°C	-	0.73	-	mJ
			T _{vj} =125°C	-	-	-	
R _{thJC}	Thermal resistance, junction to case	per diode		-	1.75	1.90	K/W
R _{thCH}	Thermal resistance, case to heatsink	per diode, λ _{grease} =1 W/(m • K)		-	1.30	-	K/W
T _{vjop}	Temperature under switching conditions			-40		150	°C

Note:

IGBT electrical characteristics according to IEC 60747 – 9

Diode electrical characteristics according to IEC 60747 – 2

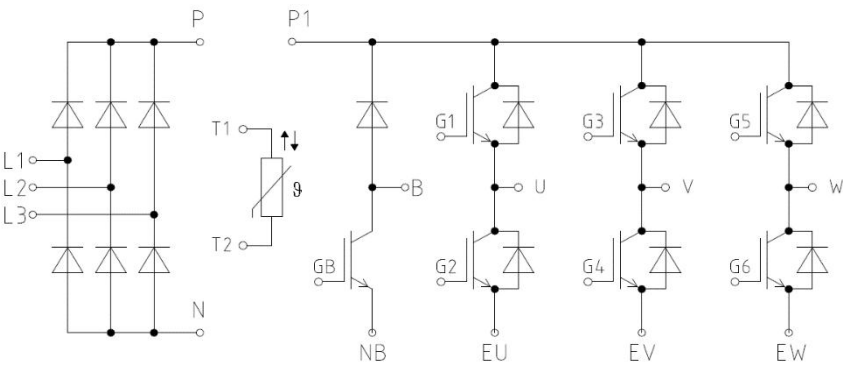
NTC Thermistor Characteristics

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	$T_C=100^{\circ}\text{C}, R_{100}=477\Omega$	-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	-	

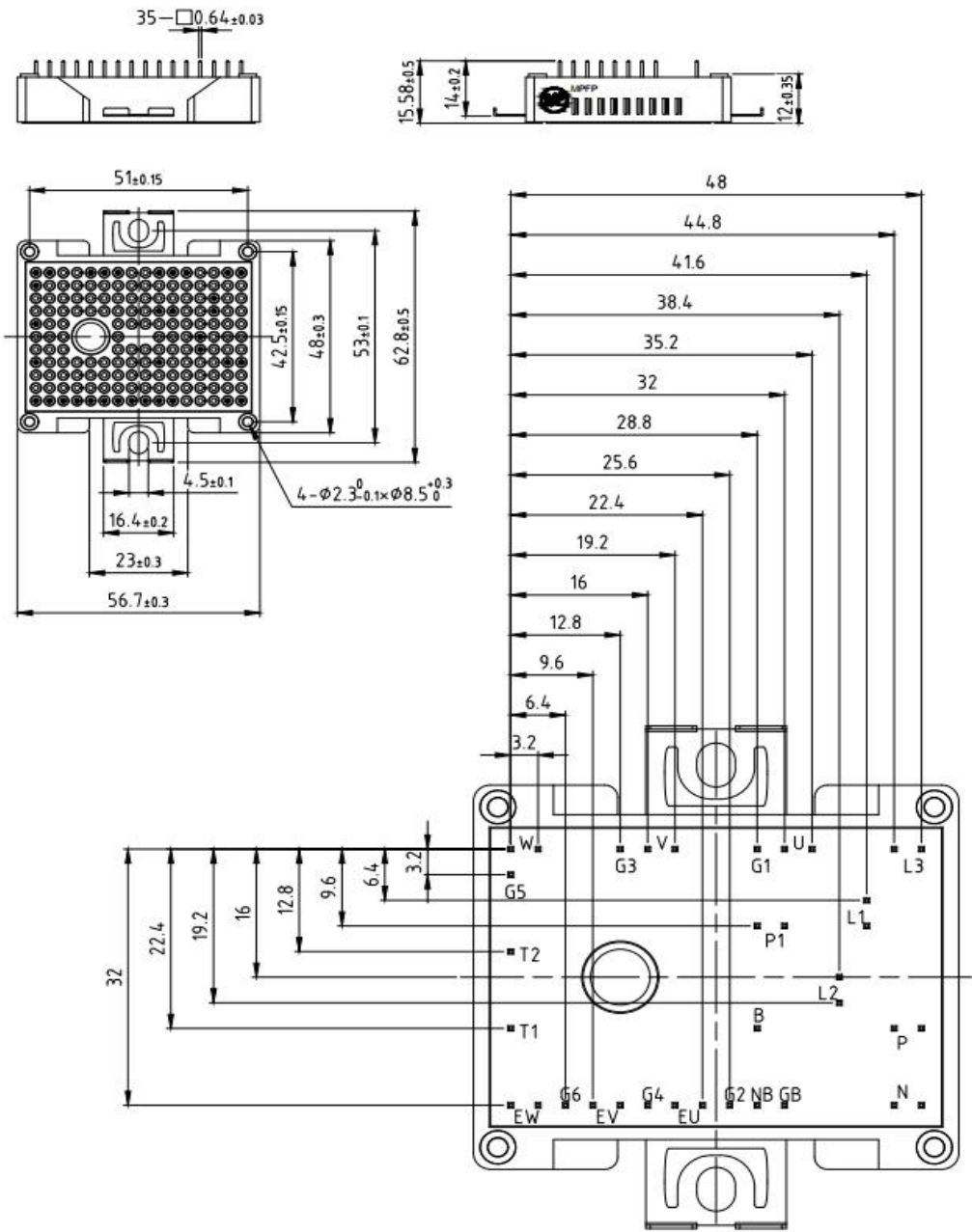
Module

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			$^{\circ}\text{C}$
$T_{vj\text{op}}$	Operating junction temperature	Continuous operationg(underswitching)	-40~150			$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40~125			$^{\circ}\text{C}$
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
F	mountig force per clamp	-	40	-	80	N
	Creepage distance	Terminal to terminal	-	6.3	-	mm
		Terminal to base plate	-	11.5	-	
	Clearance	Terminal to terminal	-	5	-	mm
		Terminal to base plate	-	10	-	
m	Weight	-	-	41	-	g

Cricuit Diagram



Package Outlines



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