

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	$T_{vj}=25^{\circ}C$	1200			V	
V_{GES}	Gate-emitter voltage	-	± 20			V	
I_C	Collector current,DC	$T_C=100^{\circ}C, T_{vj}=175^{\circ}C$	25			A	
I_{CRM}	Repetitive peak collector current	$t_p=1ms$	50			A	
P_{tot}	Total power dissipation	$T_C=25^{\circ}C, T_{vj}=175^{\circ}C$	176			W	
Characteristics Values							
Symbol	Item	Conditions	Values			Unit	
			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	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$	-	-	500	nA	
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=0.8mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}C$	5.2	5.77	6.5	V	
V_{CEsat}	Collector-emitter saturation voltage	$I_C=25A$ $V_{GE}=15V$	$T_{vj}=25^{\circ}C$	-	2.09	-	V
			$T_{vj}=125^{\circ}C$	-	-	-	
			$T_{vj}=150^{\circ}C$	-	-	-	
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	$T_{vj}=25^{\circ}C$	-	-	-	Ω	

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=25A$ $V_{GE}=\pm 15V$ $R_{G(on)}=20\Omega$ $R_{G(off)}=20\Omega$	$T_{vj}=25^\circ C$	-	73.3	-	ns
			$T_{vj}=125^\circ C$	-	83.7	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_r	Rise time		$T_{vj}=25^\circ C$	-	23.8	-	
			$T_{vj}=125^\circ C$	-	25.7	-	
			$T_{vj}=150^\circ C$	-	-	-	
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	184.2	-	
			$T_{vj}=125^\circ C$	-	199.9	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_f	Fall time		$T_{vj}=25^\circ C$	-	301.3	-	
			$T_{vj}=125^\circ C$	-	383.1	-	
			$T_{vj}=150^\circ C$	-	-	-	
E_{on}	Turn-on energy (per pulse)	$T_{vj}=25^\circ C$	-	3.38	-	mJ	
		$T_{vj}=125^\circ C$	-	4.51	-		
		$T_{vj}=150^\circ C$	-	-	-		
E_{off}	Turn-off energy (per pulse)	$T_{vj}=25^\circ C$	-	1.25	-		
		$T_{vj}=125^\circ C$	-	1.70	-		
		$T_{vj}=150^\circ C$	-	-	-		
SC data	Short-circuit current	$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=125^\circ C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	107	-	A	
R_{thJC}	Thermal resistance, junction to case	Per IGBT	-	0.75	0.85	K/W	
R_{thCH}	Thermal resistance, case to heatsink	Per IGBT $\lambda_{grease}=1W/(m\cdot K)$	-	0.7	-	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				25	A	
I_{FRM}	Repetitive peak forward current	$t_p=1ms$			50	A	
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=150^\circ C$			75	A^2s	
Characteristic Values							
V_F	Continuous forward voltage	$I_F=25A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	2.24	-	V
			$T_{vj}=125^\circ C$	-	-	-	
			$T_{vj}=150^\circ C$	-	-	-	
I_{RM}	Peak reverse recovery current	$V_R=600V$ $I_F=25A$ $V_{GE}=-15V$	$T_{vj}=25^\circ C$	-	37.22	-	A
			$T_{vj}=125^\circ C$	-	49.23	-	
			$T_{vj}=150^\circ C$	-	-	-	
t_{rr}	Reverse recovery time		$T_{vj}=25^\circ C$	-	56.3	-	ns
			$T_{vj}=125^\circ C$	-	221.5	-	
			$T_{vj}=150^\circ C$	-	-	-	
Q_r	Recovered charge	$T_{vj}=25^\circ C$	-	1.25	-	μC	
		$T_{vj}=125^\circ C$	-	2.55	-		
		$T_{vj}=150^\circ C$	-	-	-		

E _{rec}	Reverse recovery energy		T _{vj} =25°C	-	0.12	-	mJ
			T _{vj} =125°C	-	0.73	-	
			T _{vj} =150°C	-	-	-	
R _{thJC}	Thermal resistance, junction to case	per diode	-	1.10	1.20	K/W	
R _{thCH}	Thermal resistance, case to heatsink	per diode, λ _{grease} =1 W/(m • K)	-	0.9	-	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, T _{vj} =150°C		370			A
I ² t	I ² t-value	V _R =0V, t _p =10ms, T _{vj} =150°C		685			A ² s
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			Min.	Typ.	Max.		
V _F	Continuous forward voltage	I _F =25A V _{GE} =0V	T _{vj} =25°C	-	1.12	-	V
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
I _R	Reverse current	V _R =1600V	T _{vj} =25°C	-	-	10	uA
			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	
T _{vjop}	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		25			A
I _{CRM}	Repetitive peak collector current	t _p =1ms		50			A
P _{tot}	Total power dissipation	T _C =25°C, T _{vj} =175°C		175			W
Characteristic Values							
Symbol	Item	Conditions	Values			Unit	
			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 =25A V _{GE} =15V	T _{vj} =25°C	-	2.24	-	
			T _{vj} =125°C	-	-	-	
			T _{vj} =150°C	-	-	-	
C _{ies}	Input capacitance	V _{CE} =25V, V _{GE} =0V f=1MHz, T _{vj} =25°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°C		-	171	-	nC
R _g	Internal gate resistance	T _{vj} =25°C		-	-	-	Ω
t _{d(on)}	Turn-on delay time		T _{vj} =25°C	-	71.1	-	
			T _{vj} =125°C	-	82.8	-	
			T _{vj} =150°C	-	-	-	
t _r	Rise time		T _{vj} =25°C	-	26.3	-	
			T _{vj} =125°C	-	28.2	-	
			T _{vj} =150°C	-	-	-	
t _{d(off)}	Turn-off delay time	V _{CC} =600V I _C =25A V _{GE} =±15V	T _{vj} =25°C	-	184.1	-	ns
			T _{vj} =125°C	-	196.2	-	
			T _{vj} =150°C	-	-	-	
t _f	Fall time	R _{G(on)} =20Ω R _{G(off)} =20Ω	T _{vj} =25°C	-	277.2	-	
			T _{vj} =125°C	-	382.4	-	
			T _{vj} =150°C	-	-	-	
E _{on}	Turn-on energy (per pulse)		T _{vj} =25°C	-	4.35	-	
			T _{vj} =125°C	-	5.00	-	
			T _{vj} =150°C	-	-	-	
E _{off}	Turn-off energy (per pulse)		T _{vj} =25°C	-	0.97	-	mJ
			T _{vj} =125°C	-	1.38	-	
			T _{vj} =150°C	-	-	-	
SC data	Short-circuit current	V _{CC} =600V, V _{GE} ≤15V, T _{vj} =125°C V _{CES} ≤1200V, t _p ≤10μs		-	100	-	A
R _{thJC}	Thermal resistance, junction to case	Per IGBT		-	0.75	0.85	K/W
R _{thCH}	Thermal resistance, case to heatsink	Per IGBT λ _{grease} =1W/(m·K)		-	0.70	-	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	-	2.2	-	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	-	22.74	-	A
			T _{vj} =125°C	-	29.2	-	
			T _{vj} =150°C	-	-	-	
t _{rr}	Reverse recovery time		T _{vj} =25°C	-	42.5	-	ns
			T _{vj} =125°C	-	112	-	
Q _r	Recovered charge		T _{vj} =25°C	-	0.68	-	μC
		T _{vj} =125°C	-	1.16	-		
E _{rec}	Reverse recovery energy	T _{vj} =25°C	-	0.02	-	mJ	
		T _{vj} =125°C	-	0.14	-		
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

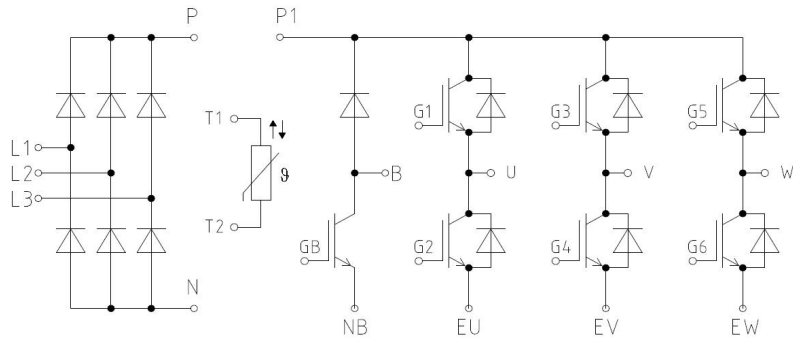
NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R ₂₅	Rated resistance	T _C =25°C	-	5	-	kΩ
ΔR/R	Deviation of resistance	T _C =100°C, R ₁₀₀ =493Ω	-5	-	5	%
P ₂₅	Power dissipation	T _C =25°C	-	-	20	mW
B _{25/50}	B-constant	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]	-	3375	-	K
B _{25/80}	B-constant	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]	-	3411	-	
B _{25/100}	B-constant	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ -1/(298.15K))]	-	3433	-	

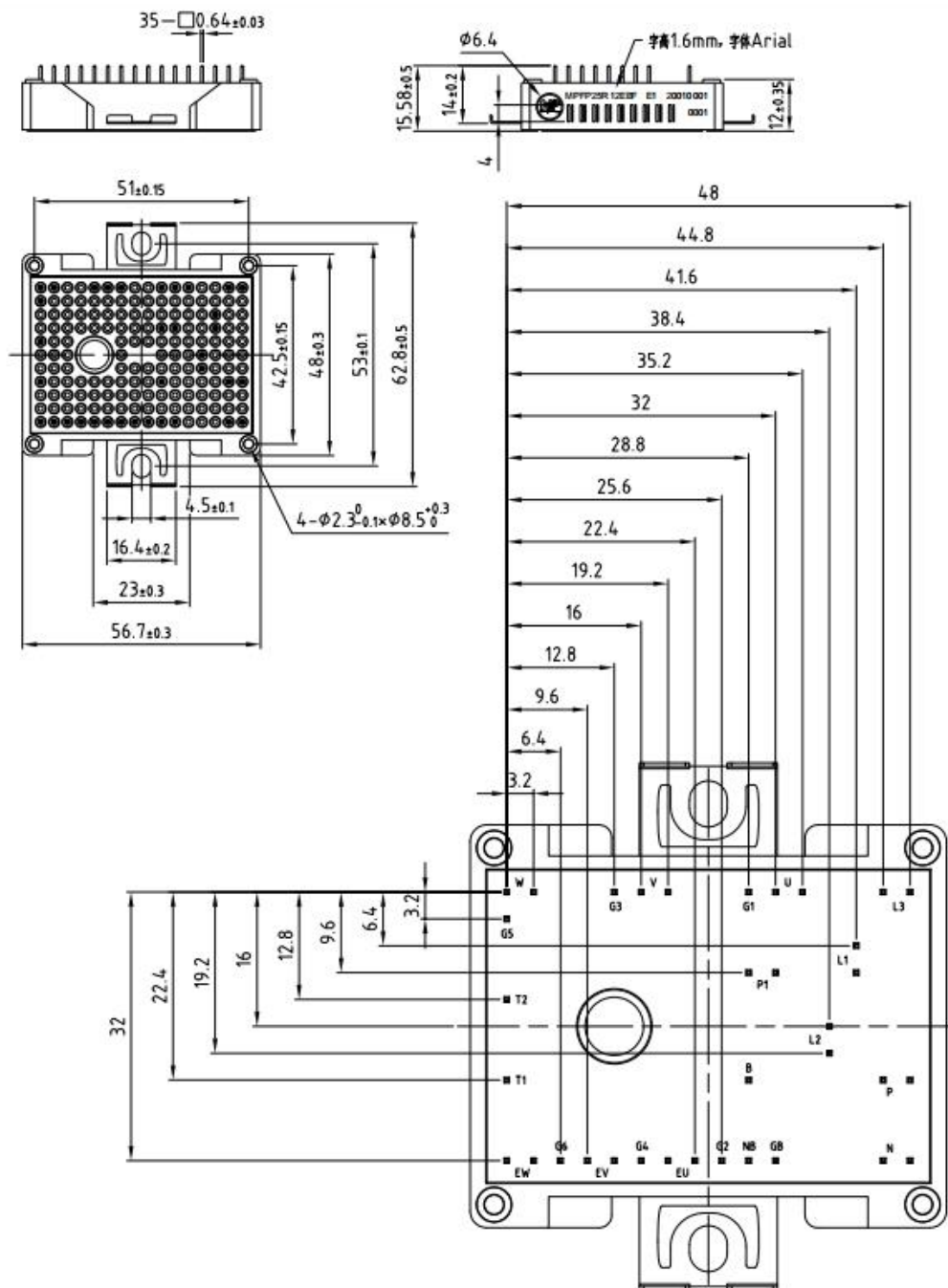
Module

Symbol	Item	Conditions	Rating			Unit
V _{ISOL}	Isolation voltage	Terminals to baseplate, RMS, f=50Hz, t=1min	2500			V
T _{vj max}	Maximum junction temperature	-	175			°C
T _{vj op}	Operating junction temperature	Continuous operation(underswitching)	-40~150			°C
T _{stg}	Storage temperature	-	-40~125			°C
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
F	mounting force per clamp	-	40	-	80	N
ds	Creepage distance	Terminal to terminal	-	6.3	-	mm
		Terminal to base plate	-	11.5	-	
da	Clearance	Terminal to terminal	-	5	-	mm
		Terminal to base plate	-	10	-	
m	Weight	-	-	38	-	g

Circuit Diagram



Package Outlines



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