MPFB15R12WBF

1200V 15A IGBT Module

Electrical Features

- Low Switching Losses
- Trench IGBT 4
- V_{CE}sat with positive Temperature Coefficient
- Low V_{CE}sat

Typical Applications

- Auxiliary Inverters
- Air Conditioning
- Motor Drives

Mechanical Features

- Al2O3 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	15	A
I_{CRM}	Repetitive peak collector current	t_p=1ms	30	A
P_{tot}	Total power dissipation	T_C=25°C,T_{vj}=175°C	127	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=0.5mA,V_{CE}=V_{GE},T_{vj}=25°C		5.2	5.8	6.5	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=15A V_{GE}=15V	T_{vj}=25°C	-	2.0	-	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		-	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°C		-	0.094	-	µC
R_g	Internal gate resistance	T_{vj}=25°C		-	-	-	Ω

$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=15A V_{GE}=±15V $R_{G(on)}$=10Ω $R_{G(off)}$=10Ω	T_{vj}=25°C	-	8.73	-	ns
			T_{vj}=125°C	-	7.85	-	
			T_{vj}=150°C	-	-	-	
t_r	Rise time		T_{vj}=25°C	-	45.4	-	
			T_{vj}=125°C	-	8.14	-	
			T_{vj}=150°C	-	-	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25°C	-	112.2	-	
			T_{vj}=125°C	-	125.1	-	
			T_{vj}=150°C	-	-	-	
t_f	Fall time		T_{vj}=25°C	-	325.5	-	
			T_{vj}=125°C	-	387.8	-	
			T_{vj}=150°C	-	-	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25°C	-	1.62	-	mJ
			T_{vj}=125°C	-	2.04	-	
			T_{vj}=150°C	-	-	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25°C	-	0.68	-	
			T_{vj}=125°C	-	1.0	-	
			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		-	99	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	1.05	1.18	K/W
R_{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	1.05	-	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°C	1200	V
I_F	Forward current,DC	T_C=100°C,T_{vj}=175°C	15	A
I_{FRM}	Repetitive peak forward current	t_p=1ms	30	A
I^2t	I^2t-value	V_R=0V,t_p=10ms,T_{vj}=150°C	14	A^2s

Characteristic Values

V_F	Continuous forward voltage	I_F=15A V_{GE}=0V	T_{vj}=25°C	-	2.16	-	V
			T_{vj}=125°C	-	-	-	
			T_{vj}=150°C	-	-	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=15A V_{GE}=-15V	T_{vj}=25°C	-	38.60	-	A
			T_{vj}=125°C	-	53.17	-	
			T_{vj}=150°C	-	-	-	
t_{rr}	Reverse recovery time		T_{vj}=25°C	-	45.00	-	ns
			T_{vj}=125°C	-	99.85	-	
			T_{vj}=150°C	-	-	-	
Q_r	Recovered charge		T_{vj}=25°C	-	0.88	-	μC
			T_{vj}=125°C	-	2.22	-	
			T_{vj}=150°C	-	-	-	

E_{rec}	Reverse recovery energy		T_{vj}=25℃	-	0.11	-	mJ
			T_{vj}=125℃	-	0.47	-	
			T_{vj}=150℃	-	-	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	1.75	1.9	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode，λ_{grease}=1 W/(m • K)		-	1.30	-	K/W
Tvjop	Temperature under switching conditions			-40		150	℃

IGBT，Brake-Chopper

Maximum Rated Values							
Symbol	Item	Conditions		Values			Unit
V_{CES}	Collector-emitter voltage	T_{vj}=25℃		1200			V
V_{GES}	Gate-emitter voltage	-		±20			V
I_C	Collector current,DC	T_C=100℃,T_{vj}=175℃		15			A
I_{CRM}	Repetitive peak collector current	t_p=1ms		30			A
P_{tot}	Total power dissipation	T_C=25℃,T_{vj}=175℃		130			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℃		-	-	1	mA
I_{GES}	Gate leakage current	V_{CE}=0V,V_{GE}=20V,T_{vj}=25℃		-	-	500	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C=0.5mA,V_{CE}=V_{GE},T_{vj}=25℃		5.2	5.7	6.5	V
V_{CEsat}	Collector-emitter saturation voltage	I_C=15A V_{GE}=15V	T_{vj}=25℃	-	2.0	-	
			T_{vj}=125℃	-	-	-	
			T_{vj}=150℃	-	-	-	
C_{ies}	Input capacitance	V_{CE}=25V,V_{GE}=0V f=1MHz,T_{vj}=25℃		-	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℃		-	0.094	-	μC
R_g	Internal gate resistance	T_{vj}=25℃		-	-	-	Ω
$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C=15A V_{GE}=±15V $R_{G(on)}$=10Ω $R_{G(off)}$=10Ω	T_{vj}=25℃	-	8.73	-	ns
			T_{vj}=125℃	-	7.85	-	
			T_{vj}=150℃	-	-	-	
t_r	Rise time		T_{vj}=25℃	-	45.4	-	
			T_{vj}=125℃	-	8.14	-	
			T_{vj}=150℃	-	-	-	
$t_{d(off)}$	Turn-off delay time		T_{vj}=25℃	-	112.2	-	
			T_{vj}=125℃	-	125.1	-	
			T_{vj}=150℃	-	-	-	
t_f	Fall time		T_{vj}=25℃	-	325.5	-	
			T_{vj}=125℃	-	387.8	-	
			T_{vj}=150℃	-	-	-	
E_{on}	Turn-on energy (per pulse)		T_{vj}=25℃	-	1.62	-	mJ
			T_{vj}=125℃	-	2.04	-	

			T_{vj}=150℃	-	-	-	
E_{off}	Turn-off energy (per pulse)		T_{vj}=25℃	-	0.70	-	
			T_{vj}=125℃	-	1.0	-	
			T_{vj}=150℃	-	-	-	
SC data	Short-circuit current	V_{CC}=600V,V_{GE}≤15V,T_{vj}=125℃ V_{CES}≤1200V,t_P≤10μs		-	128	-	A
R_{thJC}	Thermal resistance,junction to case	Per IGBT		-	1.05	1.18	K/W
R_{thCH}	Thermalresistance,case to heatsink	Per IGBT λgrease=1W/(m·K)		-	1.05	-	K/W
Tvjop	Temperature under switching conditions			-40		150	℃
Diode，Brake-Chopper							
Maximum Rated Values							
Symbol	Item	Conditions		Rating			Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj}=25℃		1200			V
I_F	Forward current,DC	T_C=100℃,T_{vj}=175℃		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℃		16			A^2s
Characteristic Values							
V_F	Continuous forward voltage	I_F=10A V_{GE}=0V	T_{vj}=25℃	-	2.20	-	V
			T_{vj}=125℃	-	-	-	
			T_{vj}=150℃	-	-	-	
I_{RM}	Peak reverse recovery current	V_R=600V I_F=10A V_{GE}=-15V	T_{vj}=25℃	-	28.8	-	A
			T_{vj}=125℃	-	39.5	-	
			T_{vj}=150℃	-	-	-	
t_{rr}	Reverse recovery time		T_{vj}=25℃	-	44.8	-	ns
			T_{vj}=125℃	-	126.7	-	
Q_r	Recovered charge		T_{vj}=25℃	-	0.64	-	μC
			T_{vj}=125℃	-	1.79	-	
E_{rec}	Reverse recovery energy		T_{vj}=25℃	-	0.07	-	mJ
			T_{vj}=125℃	-	0.39	-	
R_{thJC}	Thermal resistance, junction to case	per diode		-	1.75	1.9	K/W
R_{thCH}	Thermal resistance, case to heatsink	per diode，λ_{grease}=1 W/(m • K)		-	1.30	-	K/W
Tvjop	Temperature under switching conditions			-40		150	℃

Note:

IGBT electrical characteristics according to IEC 60747 – 9

Diode electrical characteristics according to IEC 60747 – 2

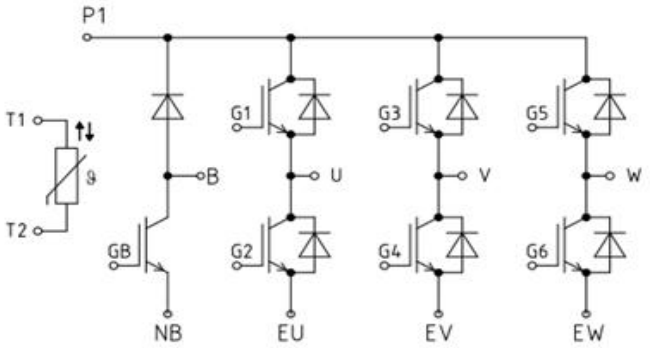
NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R_{25}	Rated resistance	T_C=25℃	-	5	-	kΩ
ΔR/R	Deviation of resistance	T_C=100℃,R_{100}=493Ω	-5	-	5	%
P_{25}	Power dissipation	T_C=25℃	-	-	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	-	

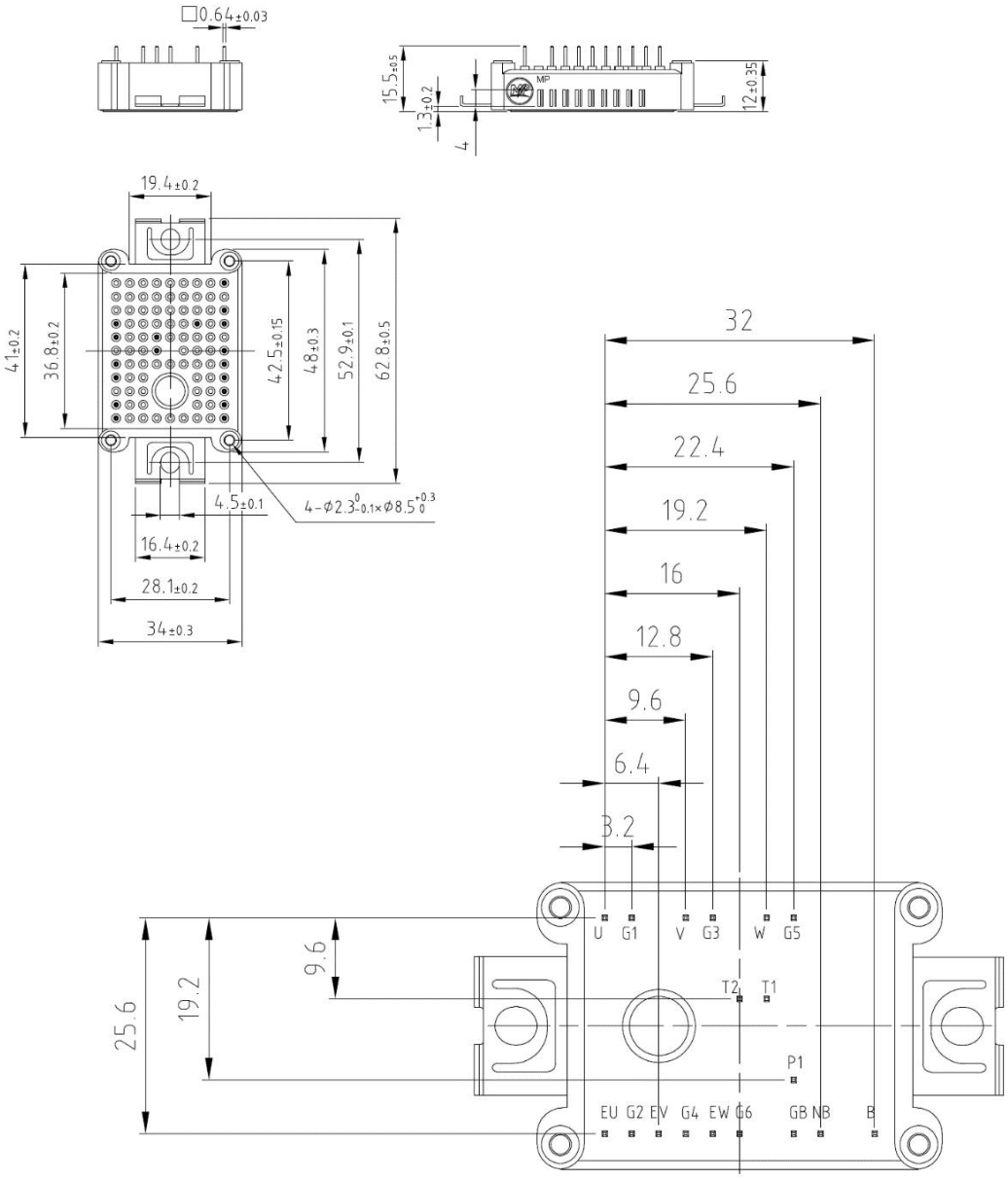
Module

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			℃
$T_{vj\ op}$	Operating junction temperature	Continuous operationg(underswitching)	-40~150			℃
T_{stg}	Storage temperature	-	-40~125			℃
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
F	mountig force per clamp	-	20	-	50	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	-	-	20	-	g

Cricuit Diagram



Package Outlines



all dimensions with tolerance of ⌖ φ0.4

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