



JMG75PM12P3S1

Features

- High Power Density
- High mechanical robustness
- Compact design
- Isolated heatsink using DBC technology
- Very low forward voltage drop
- Fast & soft reverse recovery anti-parallel FWD

Product Summary

Applications

- Active Rectifier
- Air Conditioning
- Motor Drives

IGBT, Inverter Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	$T_{vj} = 25^\circ\text{C}$	V_{CES}	1200	V
Gate-emitter peak voltage		V_{GES}	± 20	V
Continuous collector current	$T_C = 100^\circ\text{C}$	I_C	75	A

Repetitive peak collector current $T_{vj} = 25^\circ\text{C}$ $I_{CP} = 150\text{A}$ $T_{vj} = 100^\circ\text{C}$ $I_{CP} = 75\text{A}$

**IGBT, Inverter Electrical Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_C = 75\text{A}$ $V_{GE} = 15\text{V}$					

**FRED, Inverter Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	$T_{vj} = 25^\circ\text{C}$	V_{RRM}	1200	V
Continuous DC forward current		I_F	75	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	150	A

FRED, Inverter Electrical Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	$I_F \mid 75A,$ $V_{GE} = 0V$	$T_{vj} = 25^{\circ}C$	V_F		2.10	2.30	V
		$T_{vj} = 125^{\circ}C$			1.80		
Peak reverse recovery current	$I_F=75A,$ $V_R=600V,$ $V_{GE}=-15V,$ $di/dt=400 \text{ \$ } V$	$T_{vj} = 25^{\circ}C$	I_{RM}		12.2		A
		$T_{vj} = 125^{\circ}C$			22.1		
Recovery charge		$T_{vj} = 25^{\circ}C$	Q_{rr}		1.93		&
		$T_{vj} = 125^{\circ}C$			6.02		
Peak reverse recovery energy		$T_{vj} = 25^{\circ}C$	E_{rec}		0.45		mJ
		$T_{vj} = 125^{\circ}C$			1.42		
Thermal resistance, junction to case	per diode		$R_{th(j-c)}$			0.72	K/W
Temperature under switching conditions			$T_{vj \text{ op}}$	-40		150	(

**Diode, Rectifier Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	$T_{vj} = 25^\circ\text{C}$	V_{RRM}	1600	V
Bridge output current	$T_C = 80$ (	$I_{D(AV)}$	75	A
Repetitive peak forward current	$t_P = 10\text{ ms}, T_{vj} = 25^\circ\text{C}$	I_{FSM}	1000	A
	$t_P = 10\text{ ms}, T_{vj} = 150^\circ\text{C}$		800	
I^2t value for fusing	$t_P = 10\text{ ms}, T_{vj} = 25^\circ\text{C}$	I^2t	5000	A^2s
	$t_P = 10\text{ ms}, T_{vj} = 150^\circ\text{C}$		3200	

Diode, Rectifier Electrical Characteristics (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$T_{vj} = 150^\circ\text{C}, I_F = 75\text{A}$	V_F		1.0		V
Reverse current	$T_{vj} = 150^\circ\text{C}, V_R = 1600\text{V}$	I_R		2.0		mA
Thermal resistance, junction to case	per diode	$R_{th(j-c)}$			0.60	K/W
Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	(

IGBT, Brake-Chopper Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	$T_{vj} = 25^\circ\text{C}$	V_{CES}	1200	V
Gate-emitter peak voltage		V_{GES}	± 20	V
Continuous collector current	$T_C = 100^\circ\text{C}$	I_C	50	A
Repetitive peak collector current	$t_P = 1\text{ms}$	I_{CRM}	100	A
Total power dissipation	$T_C = 25^\circ\text{C}, T_{vj} = 175^\circ\text{C}$	P_{tot}	308	W

**IGBT, Brake-Chopper Electrical Characteristics (@ $T_c = 25^\circ\text{C}$ unless otherwise specified)**

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_C = 50\text{A}$, $V_{GE} = 15\text{V}$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 125^\circ\text{C}$	$V_{CE(sat)}$		1.80 2.10	2.15	V
Gate threshold voltage	$V_{CE}=V_{GE}$, $I_C=2.0\text{mA}$		$V_{GE(th)}$	5.6	6.2	6.8	V
Gate-emitter leakage current	$V_{CE} = 0\text{V}$, $V_{GE} = 20\text{V}$		I_{GES}			400	nA
Collector-emitter cut-off current	$V_{CE}=1200\text{V}$ $V_{GE}=0\text{V}$		I_{CES}			1	mA
Input capacitance	$f = 1\text{MHz}$, $T_{vj} = 25^\circ\text{C}$, $V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$		C_{ies}		5.18		nF
Output capacitance			C_{oes}		0.15		nF
Gate charge	$V_{GE} = -15\text{V} \dots +15\text{V}$		Q_G		0.39		μC
Internal gate resistor			R_{Gint}		0		Ω
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 50\text{A}$, $R_G = 15\Omega$ $V_{GE} = \pm 15\text{V}$, $T_{vj} = 25^\circ\text{C}$		$t_{d(on)}$		108		ns
Rise time, inductive load			t_r		96		ns
Turn-off delay time, inductive load			$t_{d(off)}$		219		ns
Fall time, inductive load			t_f		137		ns
Turn-on energy loss per pulse			E_{on}		4.20		mJ
Turn-off energy loss per pulse			E_{off}		2.98		mJ
Turn-on delay time, inductive load	$V_{CC} = 600\text{V}$, $I_C = 150\text{A}$, $R_G = 15\Omega$ $V_{GE} = \pm 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		$t_{d(on)}$		108		ns
Rise time, inductive load			t_r		99		ns
Turn-off delay time, inductive load			$t_{d(off)}$		257		ns
Fall time, inductive load			t_f		204		ns
Turn-on energy loss per pulse			E_{on}		6.00		mJ
Turn-off energy loss per pulse			E_{off}		4.06		mJ
SC Data	$V_{CE} = 900\text{V}$ $V_{GE} = 9\text{V}$ $V_{CC}=900\text{V}$ $T_{vj}=125^\circ\text{C}$		I_{SC}		300		A
Thermal resistance, junction to case	per IGBT		$R_{th(j-c)}$			0.60	K/W
Temperature under switching conditions			$T_{vj op}$	-40		150	$^\circ\text{C}$

**FRED, Brake-Chopper Absolute Maximum Ratings (@ TC = 25°C unless otherwise specified)**

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1200	V
Continuous DC forward current		I_F	35	A
Repetitive peak forward current	$t_P = 1\text{ms}$	I_{FRM}	70	A

FRED, Brake-Chopper Electrical Characteristics (@ TC = 25°C unless otherwise specified)

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	$I_F \mid 35A,$ $V_{GE} = 0V$	$T_{vj} = 25^{\circ}C$	V_F		2.00	2.30	V
		$T_{vj} = 125^{\circ}C$			1.70		
Peak reverse recovery current	$I_F \mid 35A,$ $V_R = 600V,$ $V_{GE} = -15V,$ $di/dt = 400 \text{ \$ } V$	$T_{vj} = 25^{\circ}C$	I_{RM}		12.7		A
		$T_{vj} = 125^{\circ}C$			19.5		
Recovered charge		$T_{vj} = 25^{\circ}C$	Q_{rr}		1.81		&
		$T_{vj} = 125^{\circ}C$			4.51		
Peak reverse recovery energy		$T_{vj} = 25^{\circ}C$	E_{rec}		0.64		mJ
		$T_{vj} = 125^{\circ}C$			1.57		
Thermal resistance, junction to case	per diode		$R_{th(j-c)}$			1.43	K/W
Temperature under switching conditions			$T_{vj \text{ op}}$	-40		175	(

**NTC-Thermistor Characteristics (@ T_C = 25°C unless otherwise specified)**

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	T _C =25 (	R ₂₅		5		K
Deviation of R100	T _C = 100°C, R ₁₀₀ = 493	- R/R	-5		5	
Power dissipation	T _C = 25°C	P ₂₅			20	mW
B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 K))]$	B _{25/50}		3375		K
B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 K))]$	B _{25/80}		3411		K
B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 K))]$	B _{25/100}		3433		K

Module Characteristics

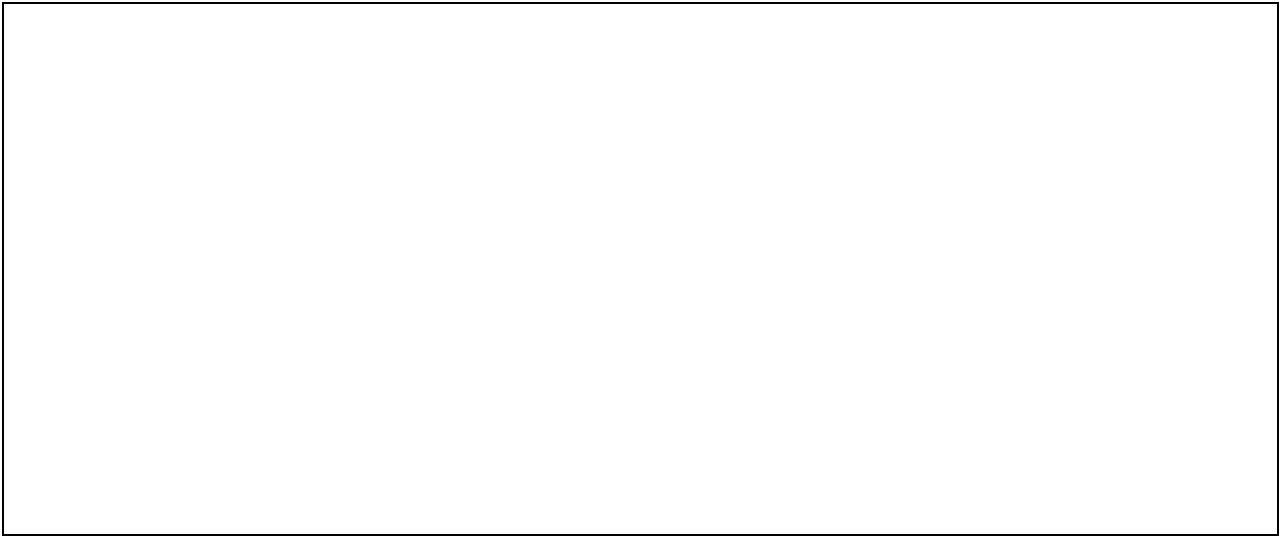
Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage (All Terminals Shorted)	RMS, f = 50Hz,1minute	V _{iso}	2.5			KV
Thermal resistance, case to heatsink	per module	R _{th(c-s)}		0.009		K/W
Maximum Junction Temperature	Inverter, brake-chopper	T _{vj max}			175	(
	rectifier				150	(
Stray inductance module		L _{SCE}		25		nH
Module lead resistance, terminals - chip	per switch	R _{CC'+EE'}		1.6		P
		R _{AA'+CC'}		1.1		P
Storage Temperature		T _{stg}	-40		125	(
Mounting force per clamp		F	3.0		6.0	N

Ordering Information

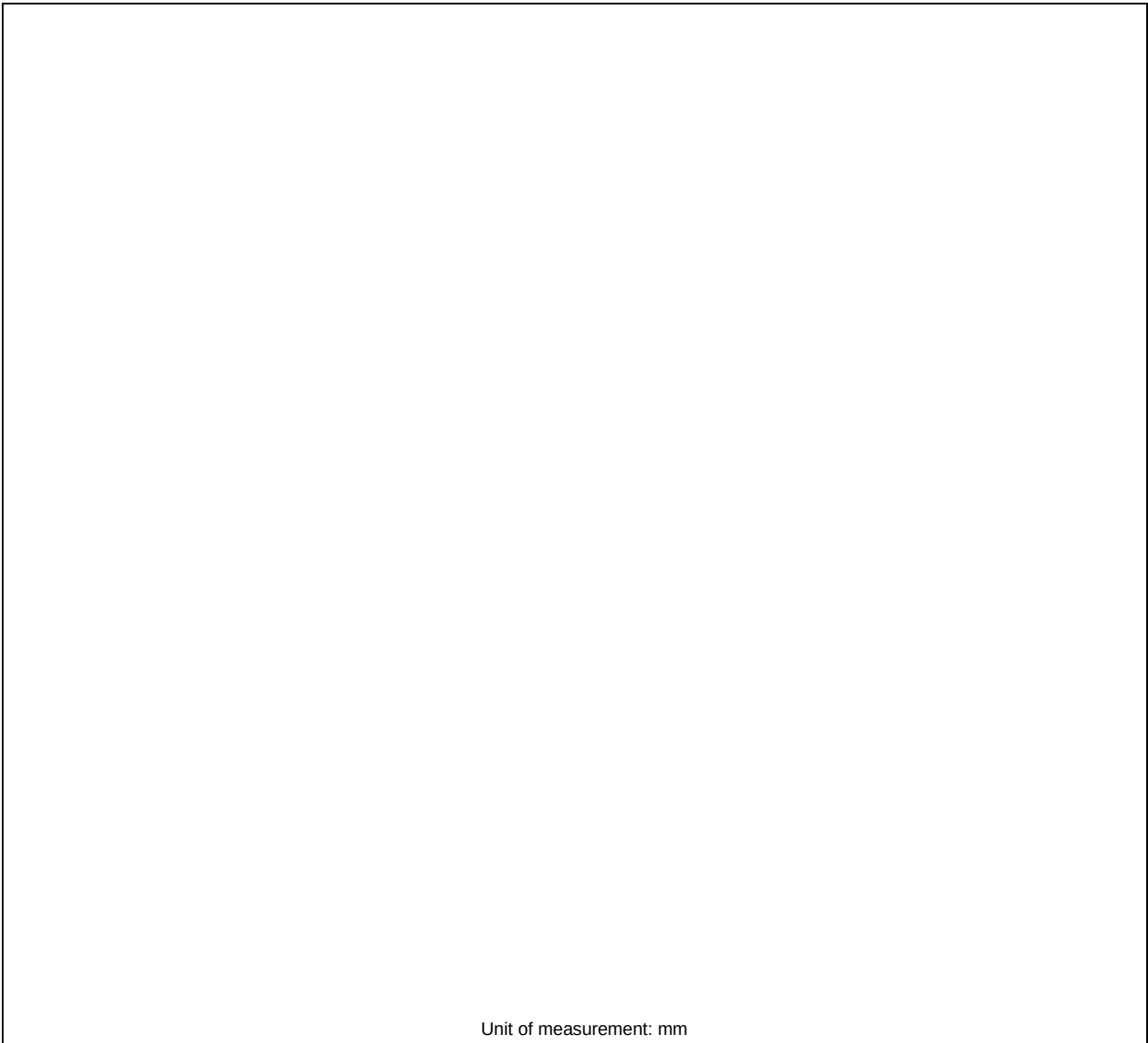
Device	Marking	Package	Weight	Inner Box	Per Carton
JMG75PM12P3S1	JMG75PM12P3S1	P3	300g/PCS	10PCS	50PCS



Circuit Diagram



Package Outlines (mm)





Typical Electrical & Thermal Characteristics

Fig 1.



Fig 5. IGBT Switching Loss vs. R_g ,
Inverter (typical)
 $I_c=75\text{ A}$, $V_{CE}=600\text{ V}$, $V_{GE}=\pm 15\text{ V}$

Fig 6. Reverse bias safe operating area
IGBT, Inverter (RBSOA)

Fig 7. FRED Forward Characteristics,
Inverter (typical)

Fig 8. FRED Switching Loss vs. I_c ,
Inverter (typical)
 $R_g=15$ $V_{CE}=600\text{ V}$

Fig 9. FRED Switching Loss vs. R_g ,
Inverter (typical)
 $I_c=75\text{ A}$, $V_{CE}=600\text{ V}$

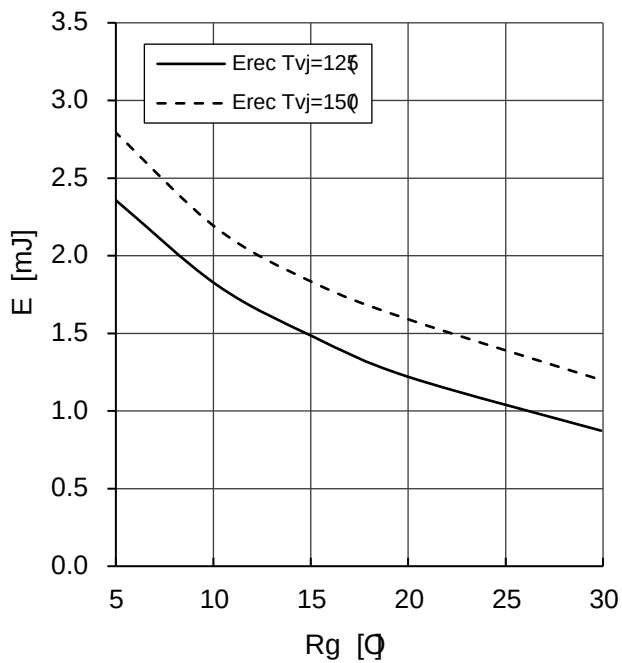


Fig 10. Diode Rectifier Forward Characteristics

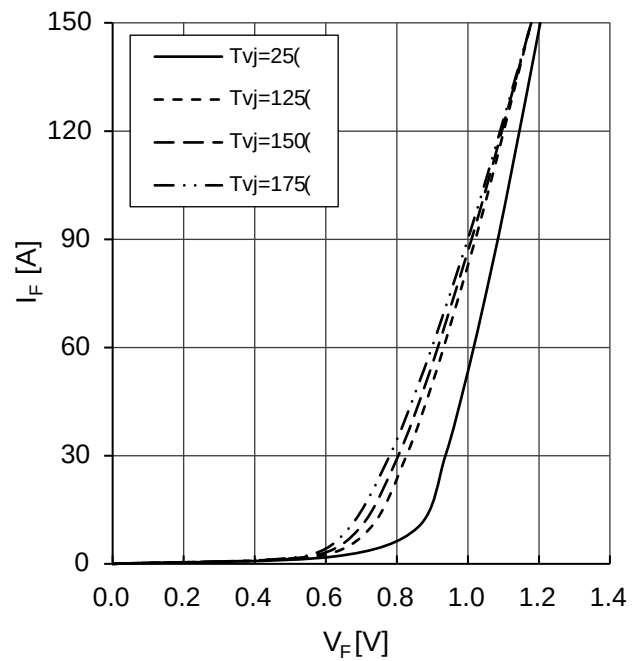


Fig 11. IGBT Output Characteristics
Brake-Chopper (typical) $V_{GE}=15\text{ V}$

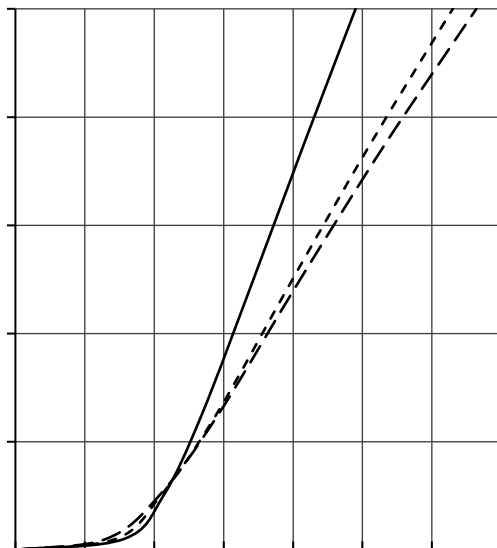


Fig 12. FRED Forward Characteristics,
Brake-Chopper (typical)

Fig 13. Temperature characteristics,
NTC thermistor (typical)

