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Microsemi
Progress Powered by Technology

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MM118-XX SERIES

600 / 1200 Volts
150 Amps

3 PHASE N-CHANNEL INSULATED GATE BIPOLAR TRANSISTOR (IGBT) BRIDGE

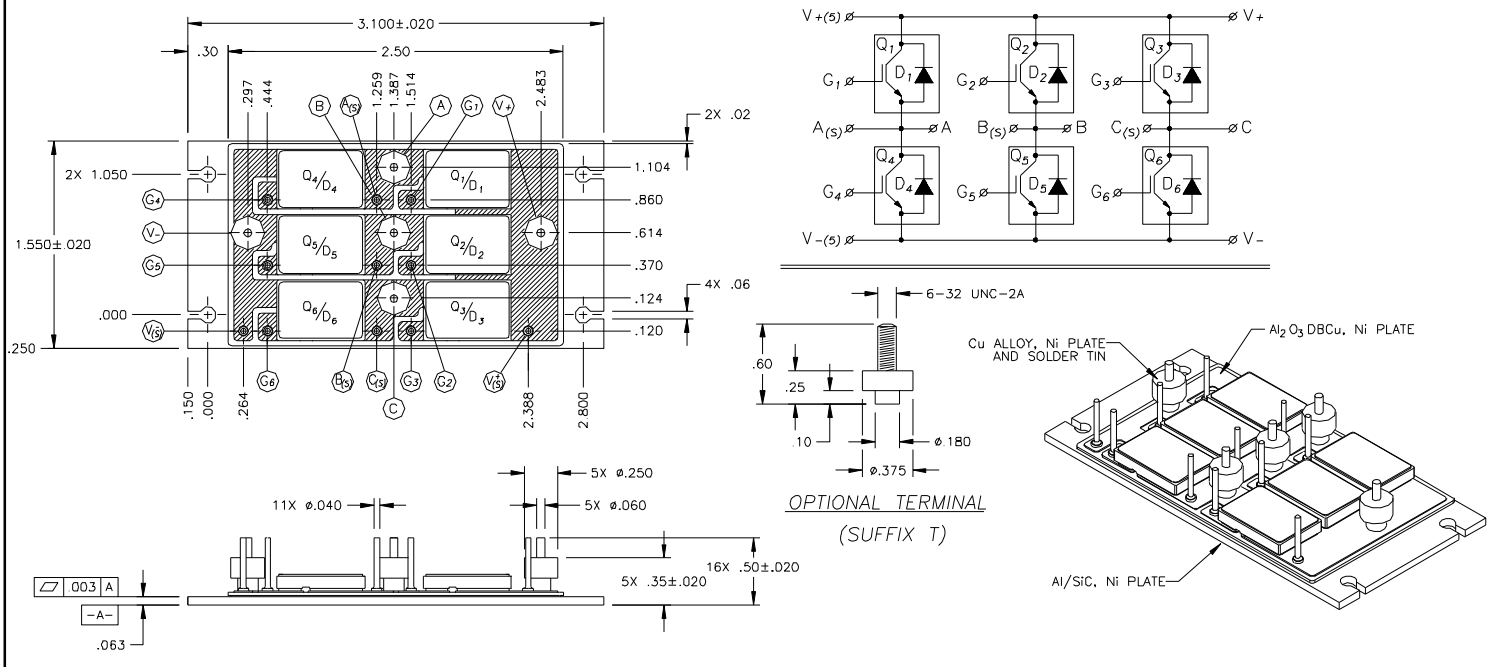
Features

- Available in Low Conduction Loss Class as MM118-xxL or Fast Switching Class as MM118-xxF
- Compact and rugged construction offering weight and space savings
- Available with PC board solderable pins (see mechanical outline below) or threaded terminals (add "T" suffix to part number, see option below)
- HPM (Hermetic Power Module)
- Isolation voltage capability (in reference to the base) in excess of 3kV
- Very low thermal resistance
- Thermally matched construction provides excellent temperature and power cycling capability
- Additional voltage ratings or terminations available upon request

Maximum Ratings per switch @ 25°C (unless otherwise specified)

PART NUMBER		SYMBOL	MM118-06	MM118-12
Collector-to-Emitter Breakdown Voltage (Gate shorted to Emitter), @ $T_j \geq 25°C$		BV_{CES}	600 V	1200 V
Collector-to-Gate Breakdown Voltage @ $T_j \geq 25°C$, R_{GS}= 1 MΩ		BV_{CGR}	600 V	1200 V
Gate-to-Emitter Voltage	continuous transient	V_{GES} V_{GEM}	+/- 20 V +/- 30 V	+/- 20 V +/- 30 V
Continuous Collector Current 25°C	T_j= T_j= 90°C	I_{C25} I_{C90}	60 A 32 A	52 A 33 A
Peak Collector Current, pulsewidth limited by $T_{j\,max}$		I_{CM}	120 A	104 A
Power Dissipation		P_D	165 W	165 W
Thermal resistance, junction to base	per switch	$R\Theta_{jc}$, max	0.75°C/W	0.75°C/W

Mechanical Outline



Datasheet# MSC0321A

Maximum Ratings @ 25°C (unless otherwise specified) - continued

DESCRIPTION	SYMBOL	MM118-06	MM118-12
Short Circuit Reverse Current (RBSOA) @ Tj= 125°C, V_{CE}= 0.8 x V_{CES}	I_{max}	64 A	66 A
Junction and Storage Temperature Range (°C)	$T_{j,}$ T_{stg}	-55 to +150	-55 to +150
Continuous Source Current (parallel Diode)	I_S	60 A	50 A
Pulse Source Current (parallel Diode)	I_{SM}	100 A	100 A

Electrical Parameters, per switch @ 25°C (unless otherwise specified)

DESCRIPTION	SYMBOL	CONDITIONS	PART	MIN	TYP.	MAX	UNIT
Collector-to-Emitter Breakdown Voltage (Gate Shorted to Emitter)	BV_{CES}	V_{GS} = 0 V, I_C = 250 µA	MM118-06 MM118-12	600 1200			V
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 250 µA V_{CE} = V_{GE}, I_C = 2.5 mA V_{CE} = V_{GE}, I_C = 350 µA	MM118-06F MM118-06L MM118-12	2.5 4 4.5	4 5.5	5.0 7 6.5	V
Gate-to-Emitter Leakage Current	I_{GES}	V_{GE} = ± 20V_{DC}, V_{CE} = 0 T_J = 25°C T_J = 125°C	(ALL)			±100 ±200	nA
Collector-to-Emitter Leakage Current (Zero Gate Voltage Collector Current)	I_{CES}	V_{CE} =0.8•BV_{CES} T_J = 25°C V_{GE} = 0 V T_J = 125°C	(ALL)			200 1000	µA
Collector-to-Emitter Saturation Voltage (1)	$V_{CE(sat)}$	V_{GE}= 15V, I_C= 30A T_J = 25°C I_C= 60A T_J = 25°C I_C= 30A T_J = 125°C I_C= 30A T_J = 25°C V_{GE}= 15V, I_C= 25A T_J = 25°C I_C= 50A T_J = 25°C I_C= 25A T_J = 125°C	MM118-06F MM118-06F MM118-06F MM018-06L MM118-12 MM118-12 MM118-12		2.2 3.5 2.2 2.2 2.7 3.4 3.3	2.9 tbd tbd 2.5 3.2 tbd 3.9	V
Forward Transconductance (1)	g_{fs}	V_{CE} ≥ 10 V; I_C = 30 A V_{CE} ≥ 10 V; I_C = 30 A	MM118-06F MM118-06L MM118-12	15 7 8.5	20 13 20		S
Input Capacitance Output Capacitance Reverse Transfer Capacitance	C_{ies} C_{oes} C_{res}	V_{GE} = 0 V, V_{CE} = 25 V, f = 1 MHz	MM118-06F MM118-06L MM118-12 MM118-06F MM118-06L MM118-12 MM118-06F MM118-06L MM118-12		2500 2760 1650 230 240 250 70 51 110	tbd tbd 2200 tbd tbd 380 tbd tbd 160	pF
INDUCTIVE LOAD, Tj= 25°C (2,3) Turn-on Delay Time Rise Time On Energy Turn-off Delay Time Fall Time Off Energy	 $t_{d(on)}$ t_{ri} E_{on} $t_{d(off)}$ t_{fi} E_{off}	V_{GE} = 15 V, L= 100 µH note 2, 3 for MM118-06: V_{CE} = 480 V, I_C = 30 A, R_G = 4.7 Ω for MM118-12: V_{CE}= 600 V, I_C= 25 A, R_G = 47 Ω	MM118-06F MM118-06L MM118-12 MM118-06F MM118-06L MM118-12 MM118-12 MM118-06F MM118-06L MM118-12 MM118-06F MM118-06L MM118-12 MM118-06F MM118-06L MM118-12		 25 60 75 30 130 65 3.6 175 400 420 125 400 45 1.3 5 2.4	 tbd tbd 110 tbd tbd 100 - tbd tbd 560 175 tbd 60 - - -	 ns ns ns ns ns ns mJ ns ns ns ns ns ns mJ mJ mJ

INDUCTIVE LOAD, Tj= 125°C (2,3)							
Turn-on Delay Time	$t_{d(on)}$	V_{GE} = 15 V, L= 100 µH note 2, 3	MM118-06F		25	tbd	ns
		for MM118-06: V_{CE} = 480 V,	MM118-06L		60	tbd	ns
Rise Time		I_C = 30 A, R_G = 4.7 Ω	MM118-12		95	tbd	ns
	t_{ri}	for MM118-12: V_{CE}= 600 V,	MM118-06F		35	tbd	ns
On Energy		I_C= 25 A, R_G = 47 Ω	MM118-06L		130	tbd	ns
			MM118-12		90	tbd	ns
Turn-off Delay Time	E_{on}		MM118-06F		1	-	mJ
			MM118-06L		4.2	-	mJ
Fall Time			MM118-12		10	-	mJ
	$t_{d(off)}$		MM118-06F		250	tbd	ns
Off Energy			MM118-06L		540	1000	ns
			MM118-12		420	tbd	ns
	t_{fi}		MM118-06F		260	tbd	ns
			MM118-06L		600	1500	ns
			MM118-12		45	tbd	ns
	E_{off}		MM118-06F		4	-	mJ
			MM118-06L		12	-	mJ
			MM118-12		4.2	-	mJ
Total Gate Charge	Q_g	V_{GE} = 15 V,	MM118-06F		125	150	nC
		for MM118-06: V_{CE} = 300V, I_C= 30 A	MM118-06L		110	150	
Gate-to-Emitter Charge		for MM118-12: V_{CE}= 600 V, I_C= 25 A	MM118-12		160	tbd	
	Q_{ge}		MM118-06F		23	35	
Gate-to-Collector (Miller) Charge			MM118-06L		34	45	
			MM118-12		20	tbd	
	Q_{gc}		MM118-06F		50	75	
			MM118-06L		47	63	
			MM118-12		75	tbd	
Antiparallel diode forward voltage (1)	V_F	I_E= 15 A T_J = 25 °C	MM118-06		-	1.5	V
		I_E= 30 A T_J = 25 °C	MM118-06		1.7	-	
		I_E= 50 A T_J = 25 °C	MM118-06		1.9	-	
		I_E= 15 A T_J = 150 °C	MM118-06		-	1.3	
		I_E= 10 A T_J = 25 °C	MM118-12		2.4	3	
		I_E= 10 A T_J = 100 °C	MM118-12		2	-	
Antiparallel diode reverse recovery time	t_{rr}	I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		-	100	ns
		I_E= 30 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		140	-	
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-12		-	tbd	
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 125°C	MM118-12		60	-	
Antiparallel diode reverse recovery charge	Q_{rr}	I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		160		nC
		I_E= 30 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		320		
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-12		tbd		
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 125°C	MM118-12		800		
Antiparallel diode peak recovery current	I_{RM}	I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		3		A
		I_E= 30 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-06		4.2		
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 25°C	MM118-12		tbd		
		I_E= 10 A, dI_E/dt= 100 A/us, T_J= 125°C	MM118-12		22		

Notes

(1) Pulse test, t £ 300 ms, duty cycle d £ 2%
(2) switching times and losses may increase for larger V_{CE} and/or R_G values or higher junction temperatures.
(3) switching losses include "tail" losses
(4) Microsemi does not manufacture the igbt die; contact Microsemi for details.