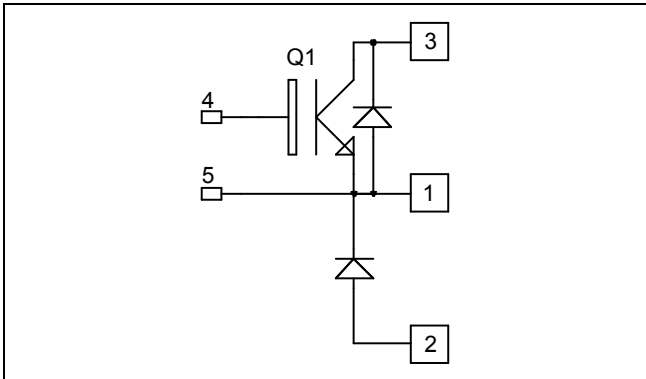


**Buck Chopper
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 600V$
 $I_C = 400A @ T_c = 80^\circ C$**



Application

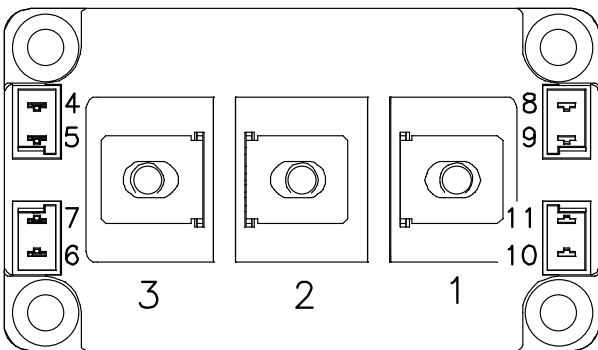
- AC and DC motor control
- Switched Mode Power Supplies

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M6 power connectors

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	600	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	500
		$T_C = 80^\circ C$	400
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	800
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	1250
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	800A @ 520V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 600V$			500	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$		$T_j = 25^\circ\text{C}$ 1.5 $T_j = 150^\circ\text{C}$ 1.7	1.9	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 6.4\text{ mA}$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		24		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		1.5		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.75		
Q_G	Gate charge	$V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 300V$		4.2		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 1.5\Omega$		110		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			490		
T_f	Fall Time			50		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 400A$ $R_G = 1.5\Omega$		130		ns
T_r	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			530		
T_f	Fall Time			70		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 300V$	$T_j = 25^\circ\text{C}$	3.2		mJ
E_{off}	Turn off Energy	$I_C = 400A$ $R_G = 1.5\Omega$	$T_j = 150^\circ\text{C}$	3.4		
			$T_j = 25^\circ\text{C}$	15		
			$T_j = 150^\circ\text{C}$	15.5		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 360V$ $t_p \leq 6\mu\text{s}; T_j = 150^\circ\text{C}$		2000		A

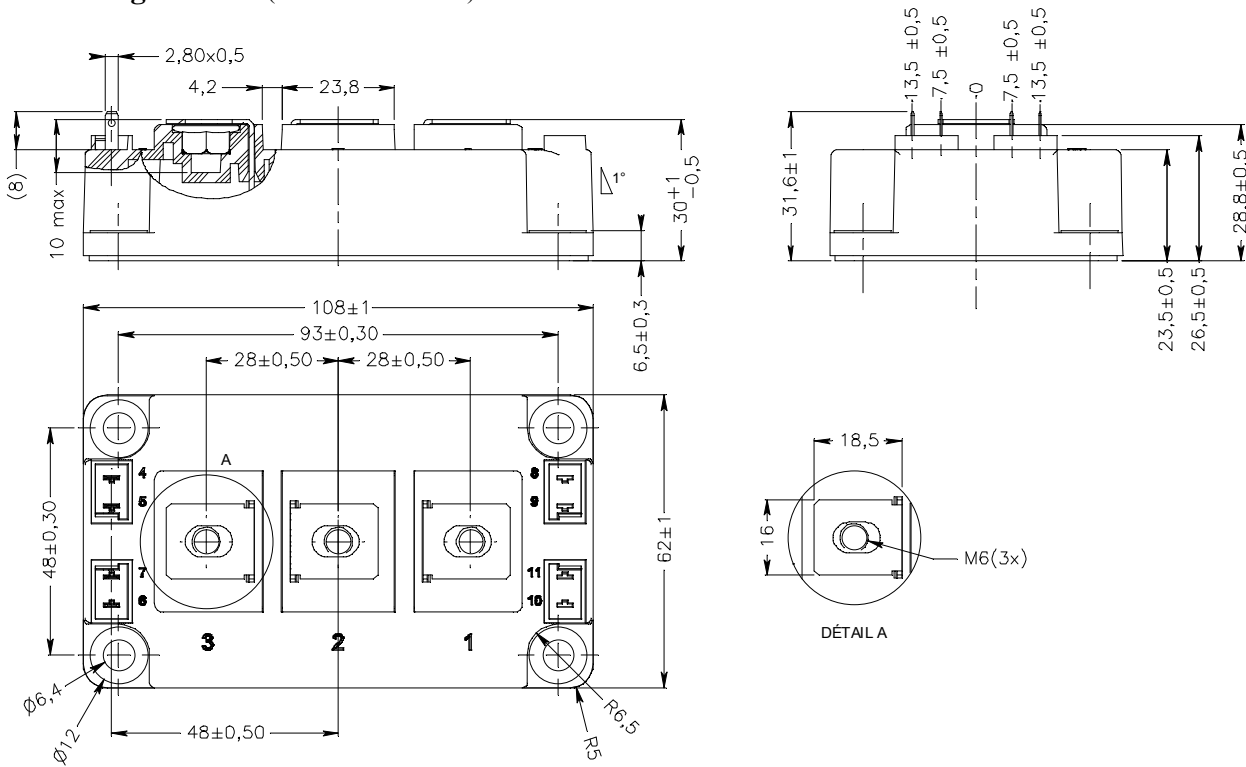
Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V
I_{RRM}	Maximum Reverse Leakage Current	$V_R = 600V$			$T_j = 25^\circ\text{C}$ 500 $T_j = 150^\circ\text{C}$ 750	μA
I_F	DC Forward Current			400		A
V_F	Diode Forward Voltage	$I_F = 400A$ $V_{GE} = 0V$	$T_j = 25^\circ\text{C}$	1.6	2	V
			$T_j = 150^\circ\text{C}$	1.5		
t_{rr}	Reverse Recovery Time	$I_F = 400A$ $V_R = 300V$ $di/dt = 4800A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	125		ns
			$T_j = 150^\circ\text{C}$	180		
Q_{rr}	Reverse Recovery Charge	$I_F = 400A$ $V_R = 300V$ $di/dt = 4800A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	18.8		μC
			$T_j = 150^\circ\text{C}$	39.5		
E_{rr}	Reverse Recovery Energy	$I_F = 400A$ $V_R = 300V$ $di/dt = 4800A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	4.4		mJ
			$T_j = 150^\circ\text{C}$	9.6		

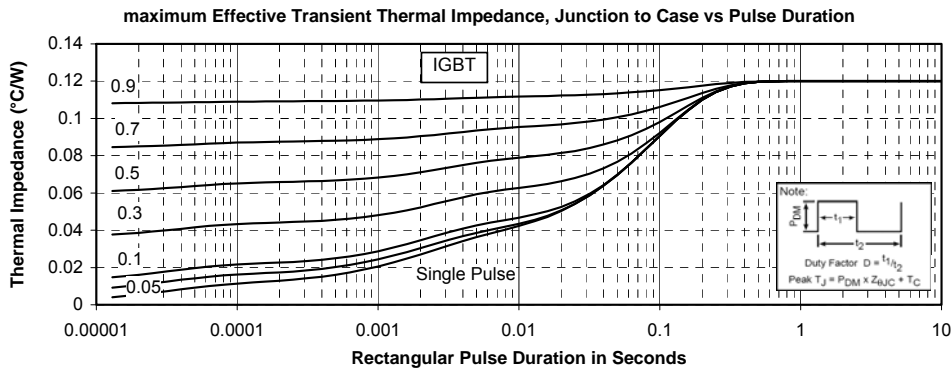
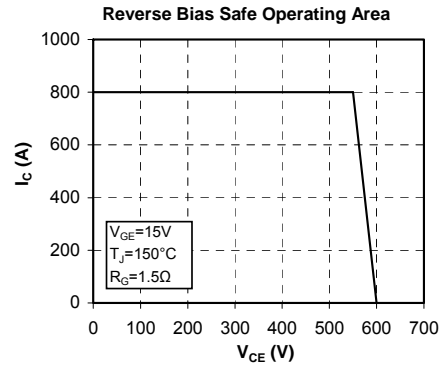
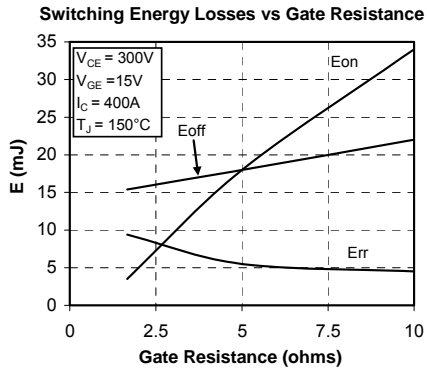
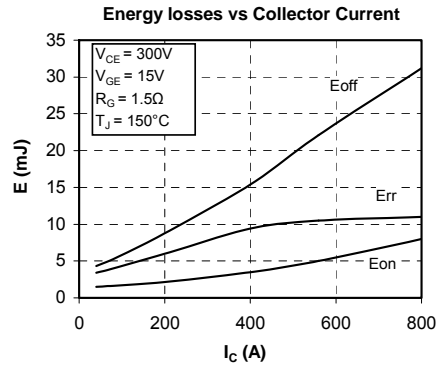
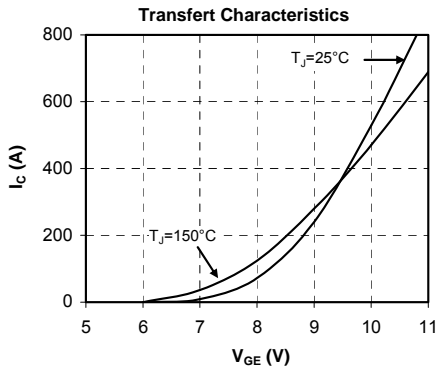
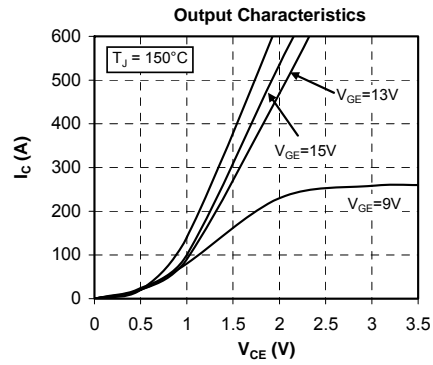
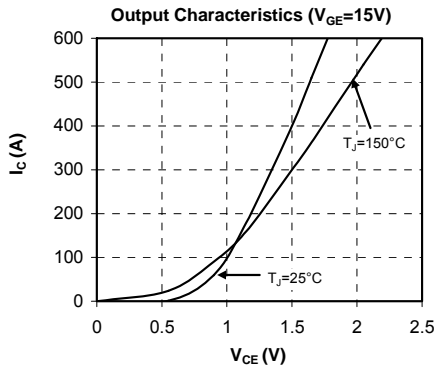
Thermal and package characteristics

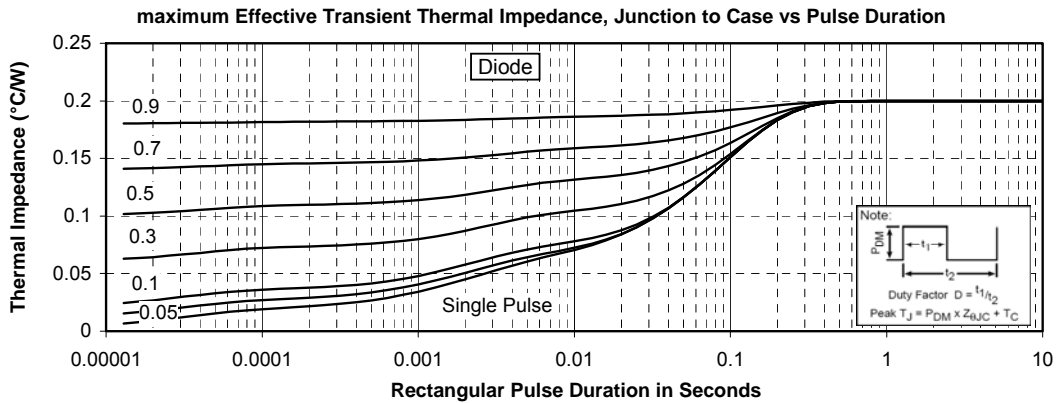
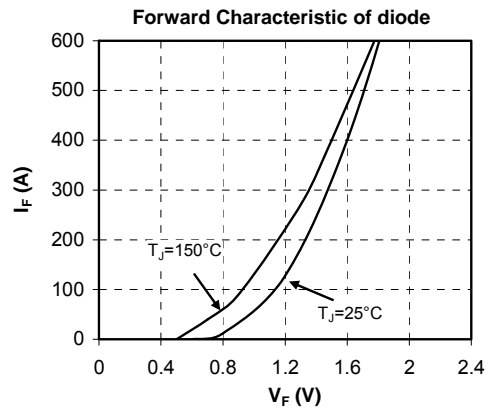
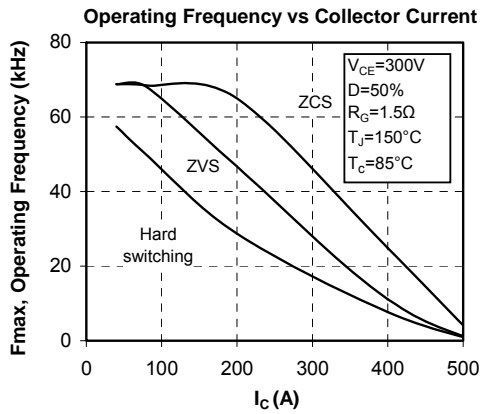
Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.12	°C/W	
		Diode		0.20		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I _{isol} <1mA, 50/60Hz	4000			V	
T _J	Operating junction temperature range	-40		175	°C	
T _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		125		
Torque	Mounting torque	For terminals	M6	3	5	N.m
		To Heatsink	M6	3	5	
Wt	Package Weight			350	g	

D3 Package outline (dimensions in mm)



Typical Performance Curve





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