

**Boost chopper
SiC FWD diode
Super Junction
MOSFET Power Module**

$V_{DSS} = 600V$
 $R_{DSon} = 18m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 143A \text{ @ } T_c = 25^\circ C$

Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

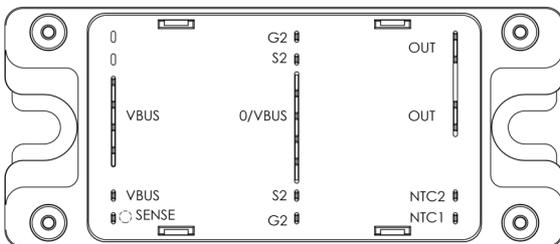
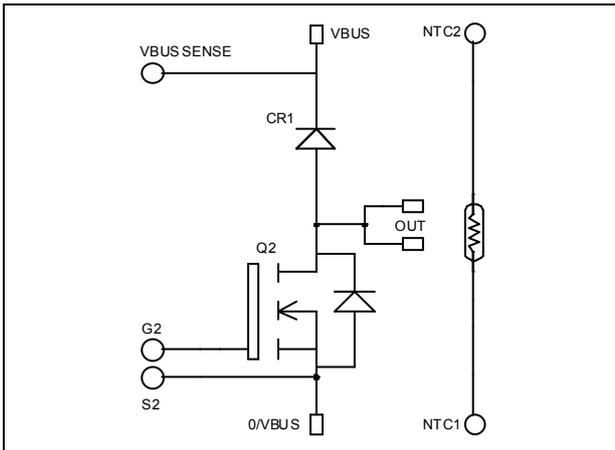
Features

- **COOLMOS**
Power Semiconductors
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated
- **FWD SiC Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF

- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- RoHS compliant



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	600	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	143
		$T_c = 80^\circ C$	107
I_{DM}	Pulsed Drain current	572	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	18	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	833
I_{AR}	Avalanche current (repetitive and non repetitive)	20	A
E_{AR}	Repetitive Avalanche Energy	1	mJ
E_{AS}	Single Pulse Avalanche Energy	1800	

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 _{DSS}	Zero Gate Voltage Drain Current	V _{GS} = 0V, V _{DS} = 600V			100	μA
		T _j = 25°C				
		V _{GS} = 0V, V _{DS} = 600V			1000	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 71.5A			18	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 4mA	2.1	3	3.9	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0V			±200	nA

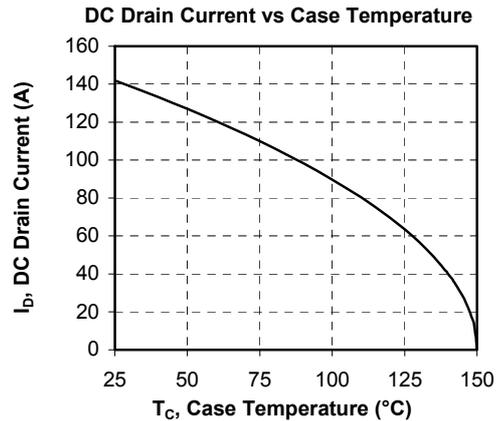
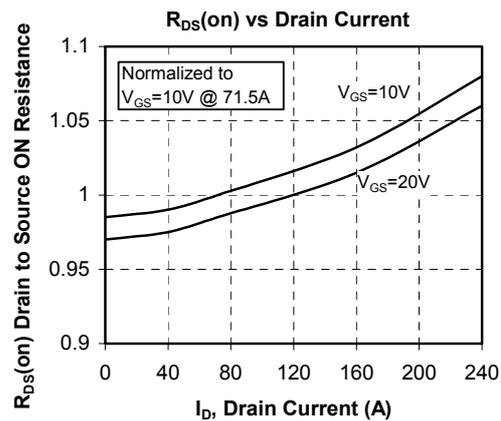
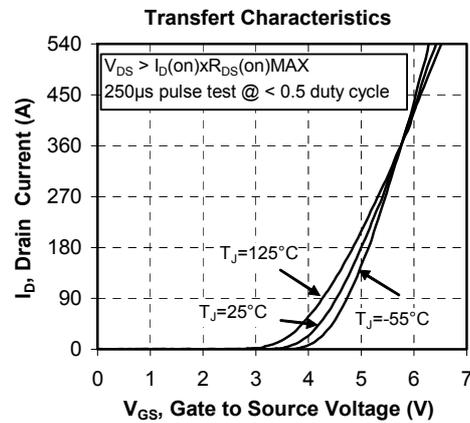
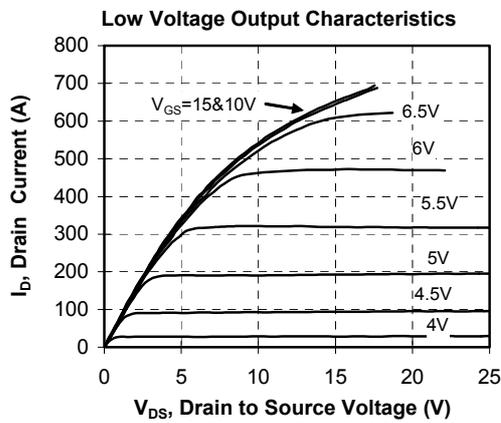
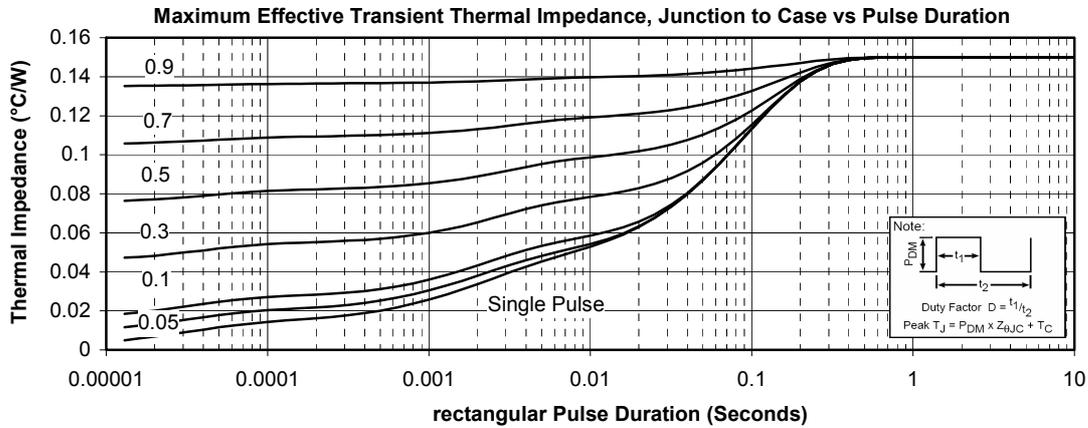
Dynamic Characteristics

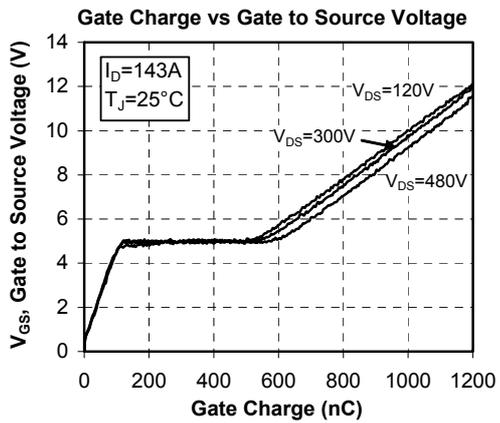
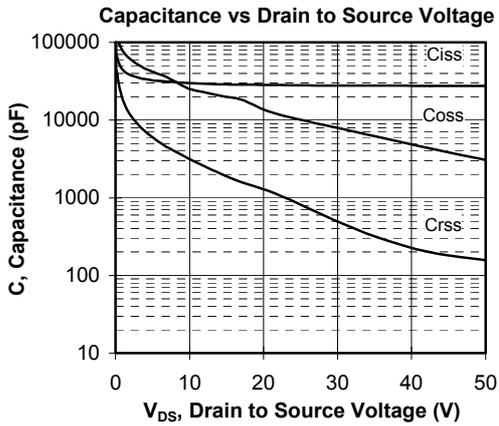
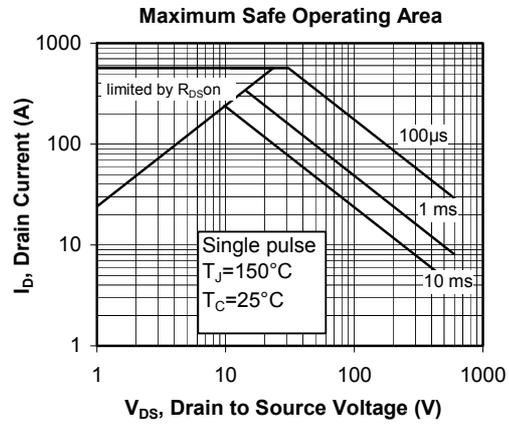
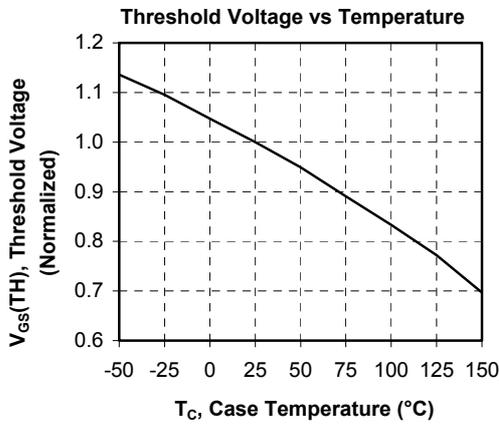
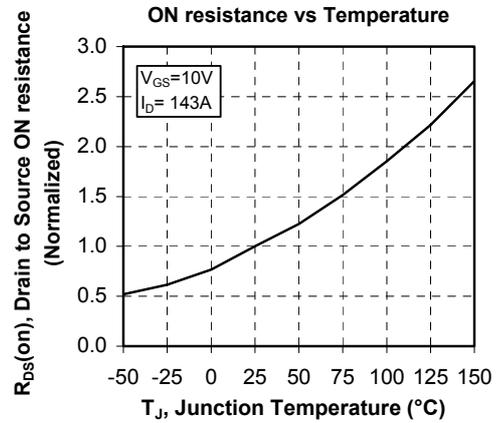
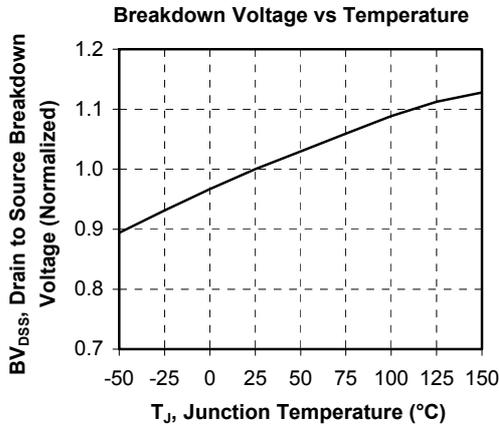
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		28		nF
C _{oss}	Output Capacitance			10.2		
C _{rss}	Reverse Transfer Capacitance			0.85		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 300V I _D = 143A		1036		nC
Q _{gs}	Gate – Source Charge			116		
Q _{gd}	Gate – Drain Charge			444		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 400V I _D = 143A R _G = 1.2Ω		21		ns
T _r	Rise Time			30		
T _{d(off)}	Turn-off Delay Time			283		
T _f	Fall Time			84		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 400V I _D = 143A, R _G = 1.2Ω		1608		μJ
E _{off}	Turn-off Switching Energy			3920		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 400V I _D = 143A, R _G = 1.2Ω		2630		μJ
E _{off}	Turn-off Switching Energy			4824		

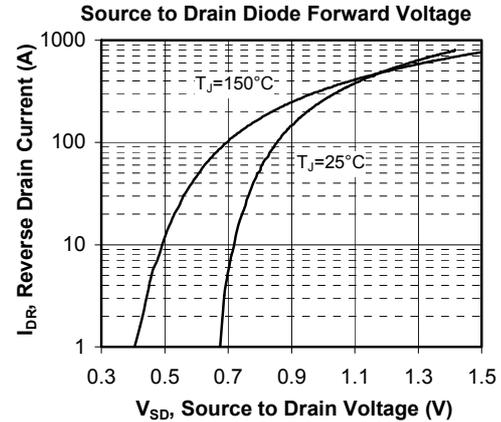
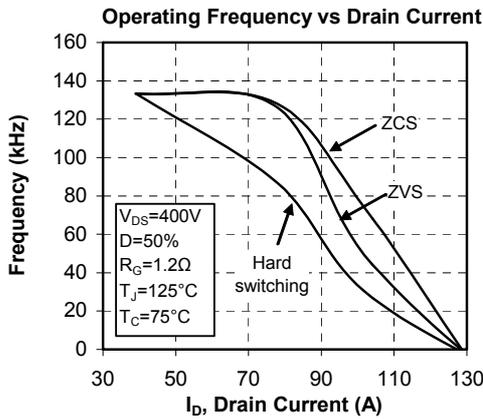
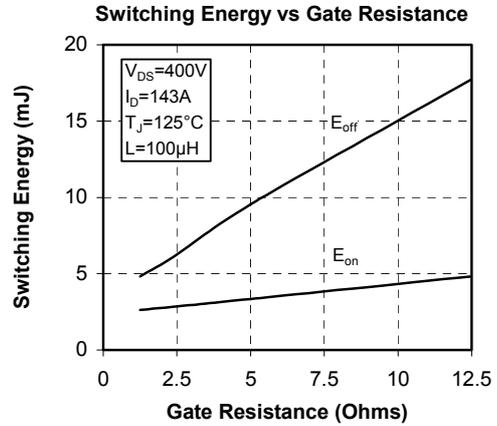
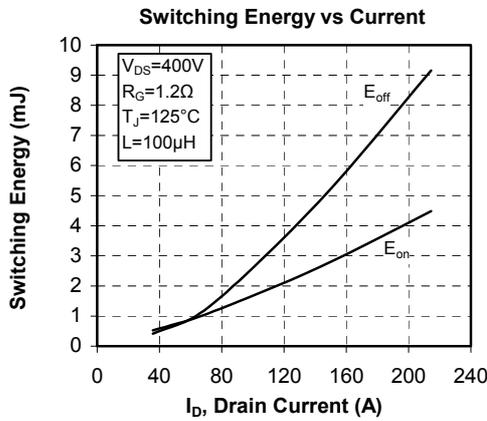
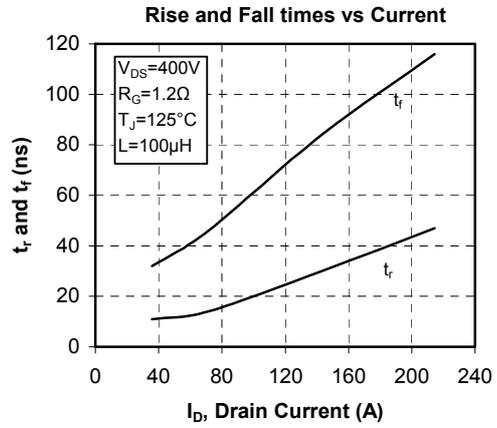
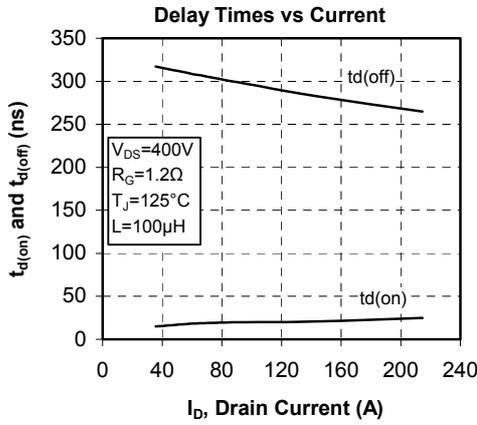
Chopper diode ratings and characteristics

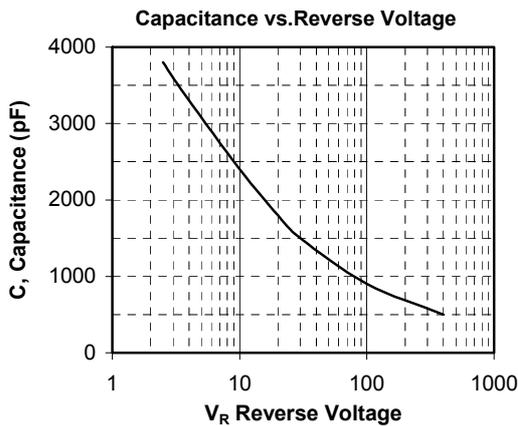
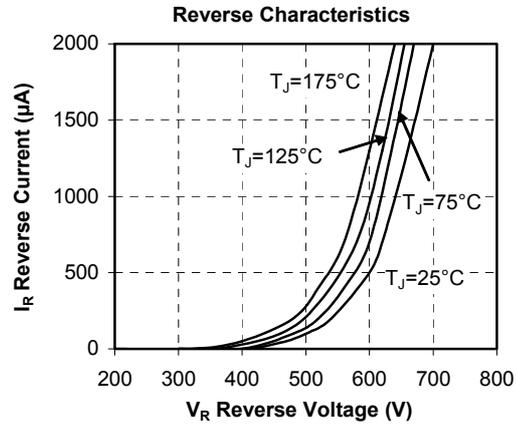
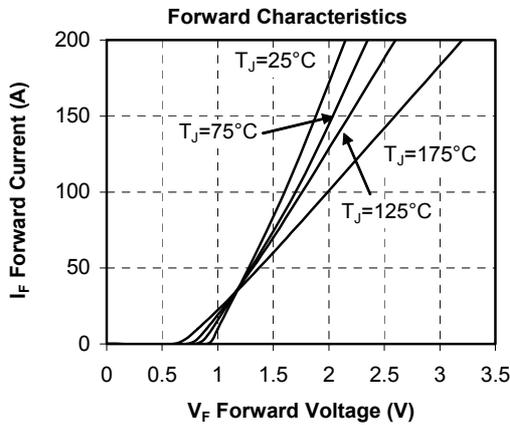
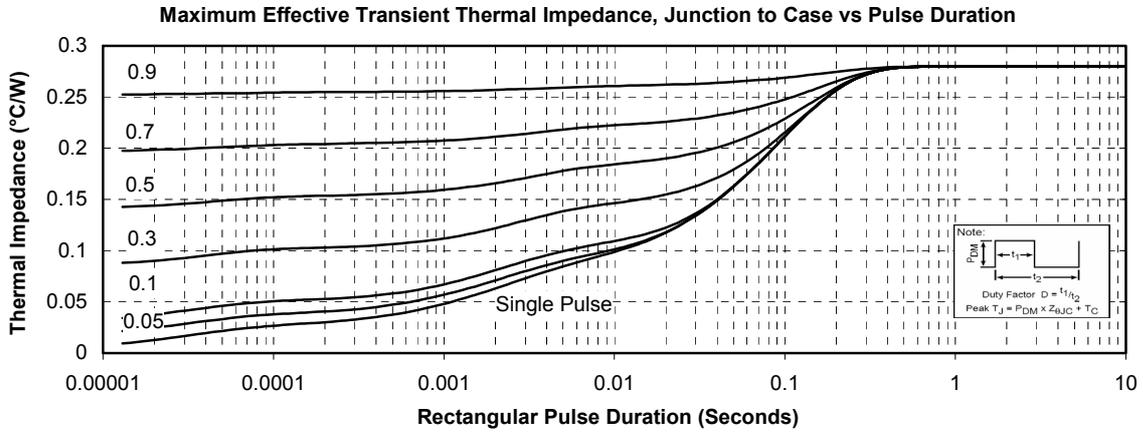
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		600			V	
I _{RM}	Maximum Reverse Leakage Current	V _R = 600V	T _j = 25°C		0.5	2	mA
			T _j = 175°C		1	10	
I _F	DC Forward Current			100		A	
V _F	Diode Forward Voltage	I _F = 100A	T _j = 25°C		1.6	1.8	V
			T _j = 175°C		2.0	2.4	
Q _C	Total Capacitive Charge	I _F = 100A, V _R = 300V di/dt = 2400A/μs		140		nC	
C	Total Capacitance	f = 1MHz, V _R = 200V		650		pF	
		f = 1MHz, V _R = 400V		500			

Typical CoolMOS Performance Curve







Typical SiC Diode Performance Curve


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