



Silicon Carbide Power MOSFET 1200V N-Channel MOS

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications

Features

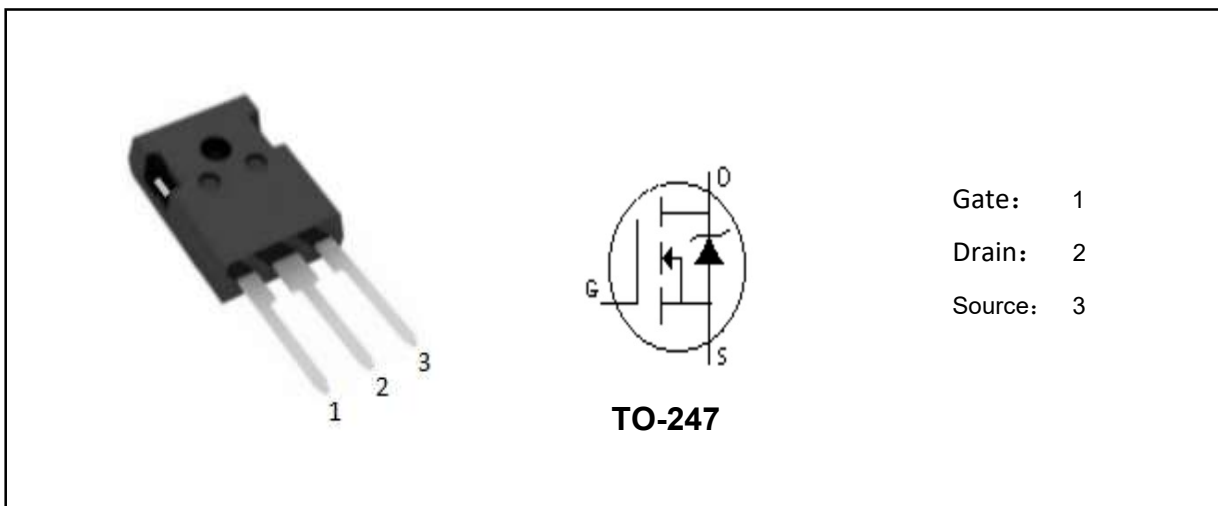
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Halogen Free, RoHS Compliant

Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Product Summary

V_{DS}	1200	V
I_D	17	A
$R_{DS(ON)}$, Typ@20V	160	mΩ
Q_g	42	nC



Marking	Package	Packaging	Min. package quantity
MS3C160R120	TO-247	Tube	450



**■ Absolute Maximum Ratings (Tc=25°C unless otherwise noted)**

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	1200	V
Gate-Source Voltage	V_{GS}	- 10/+25	V
Recommended operational values	V_{GSop}	- 5/+20	V
Continuous Drain Current Tc=25°C (Note 1)	I_D	17	A
Continuous Drain Current Tc=100°C (Note 1)		11	A
Drain Current-Pulsed (Note 1)	I_{DM}	38	A
Total Dissipation	P_D	125	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	-55~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

■ Thermal Characteristics

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	1	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	50	°C/W

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.





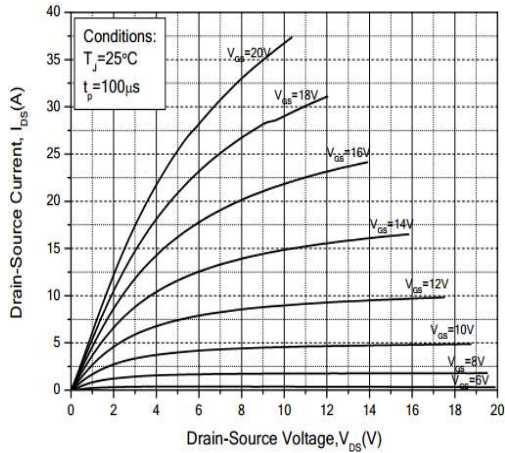
■ Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =100μA	1200	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =1200V, V _{GS} =0V	-	1	100	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	20	±200	nA
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =2.5mA	2.0	2.4	4.0	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =20V, I _D =10A	-	160	192	mΩ
		T _j =150°C	-	285	-	
Transconductance	g _{fs}	V _{GS} =20V, I _D =10A	-	4.2	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V, V _{GS} =0V, f=1.0MHz	-	950	-	pF
Output Capacitance	C _{oss}		-	35	-	pF
Reverse Transfer Capacitance	C _{rss}		-	8.5	-	pF
Gate Resistance	R _g	V _{AC} =25mV, f=1.0MHz	-	5.8	-	Ω
Switching Parameters						
Turn-On Delay Time	t _{d(on)}	V _{DS} =800V, I _D =10A, V _{GS} =-5/20V, R _G =2.5Ω R _L =80Ω, Timing relative to V _{DS} L= 256 μH	-	12	-	ns
Turn-On Rise Time	t _r		-	20	-	ns
Turn-Off Delay Time	t _{d(off)}		-	15	-	ns
Turn-Off Rise Time	t _f		-	10	-	ns
Turn-On Switching Energy	E _{ON}		-	95	-	μJ
Turn-Off Switching Energy	E _{OFF}		-	48	-	
Total Gate Charge	Q _g		V _{DD} =800V, I _D =10A, V _{GS} =-5/20V	-	42	-
Gate-Source Charge	Q _{gs}	-		9	-	nC
Gate-Drain Charge	Q _{gd}	-		17	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V _{sd}	V _{GS} =-5V, I _S =5A	-	3.5	-	V
Continuous Diode Forward Current	I _S	T _c =25°C	-	-	17	A
Reverse Recovery Time	t _{rr}	V _{GS} =-5V, I _{SD} =10A V _R =800V di/dt=1000A/μs	-	14	-	ns
Reverse Recovery Charge	Q _{rr}		-	44	-	nC
Peak Reverse Recovery Current	I _{imm}		-	6.0	-	A

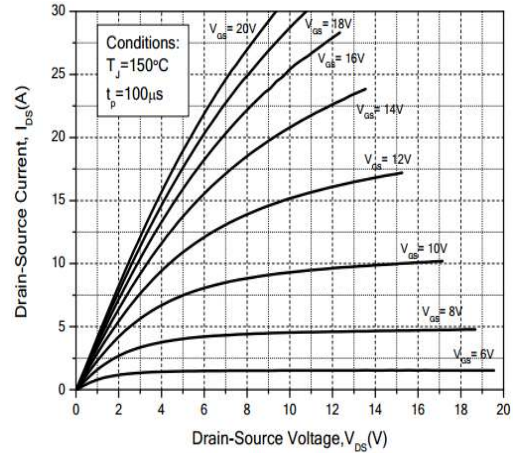




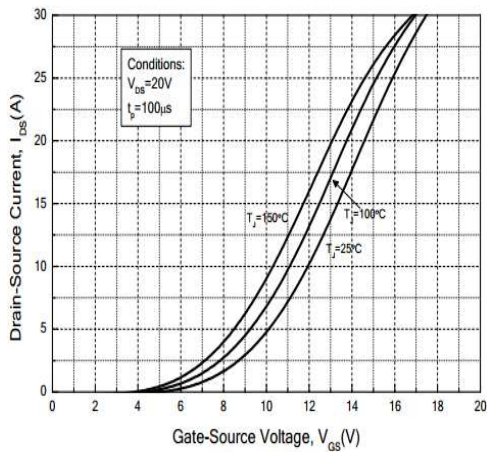
Characteristics Curves



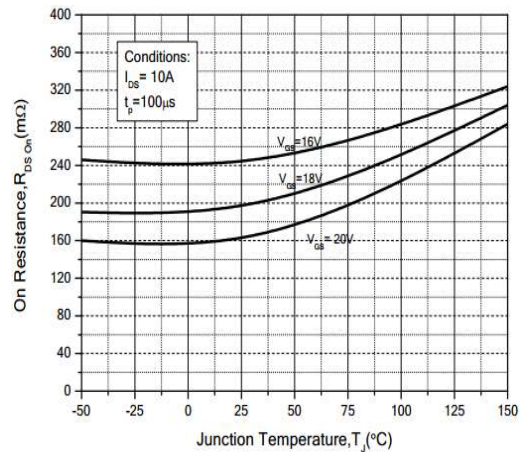
Output Characteristics $T_J = 25^\circ\text{C}$



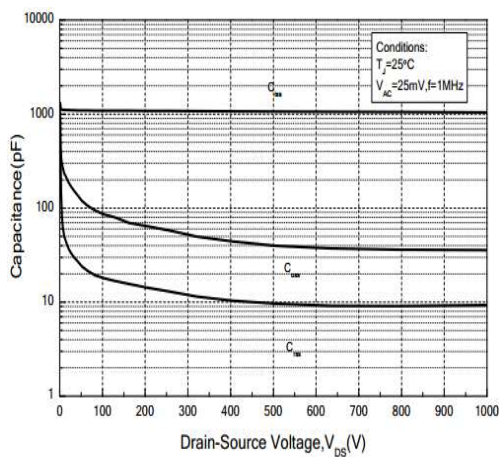
Output Characteristics $T_J = 150^\circ\text{C}$



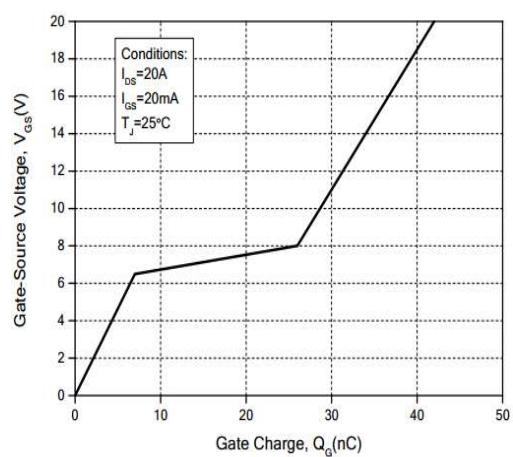
Transfer Characteristics



Normalized On-Resistance vs. Temperature

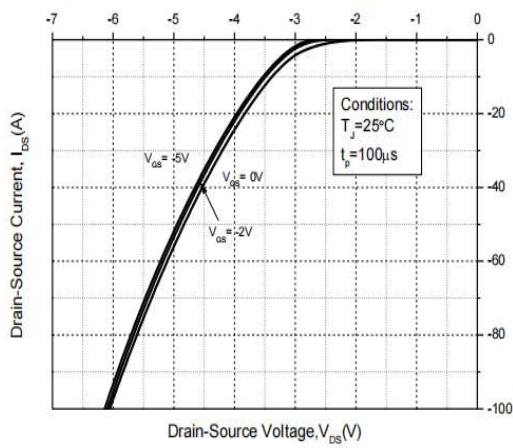


Capacitance

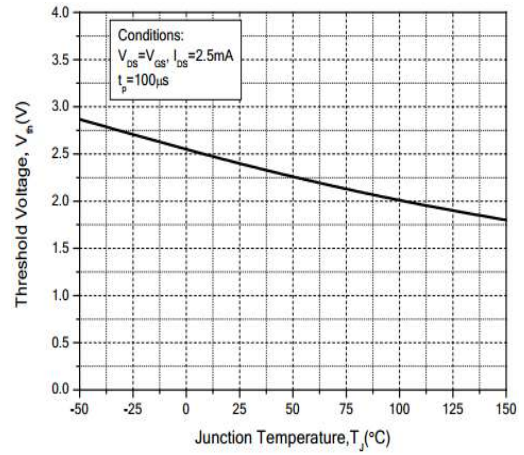


Gate Charge Waveform

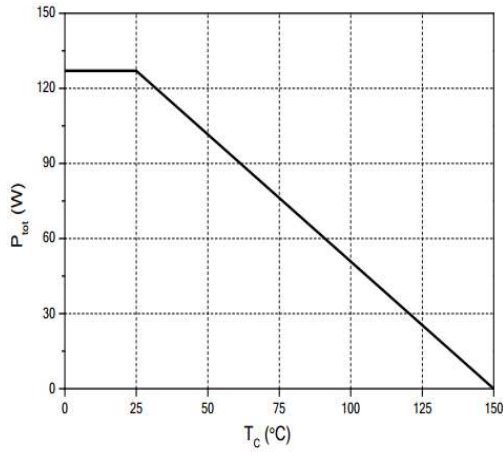




Source-Drain Diode Characteristics



Threshold Voltage vs. Temperature



Power Dissipation Derating

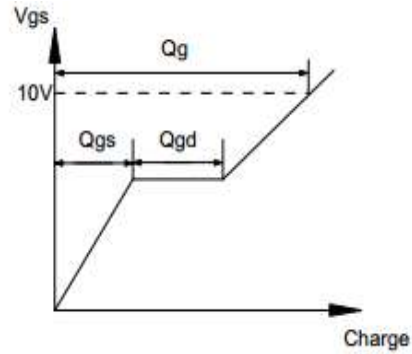
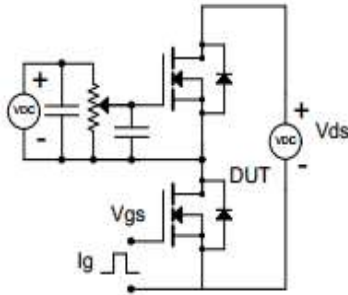
Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



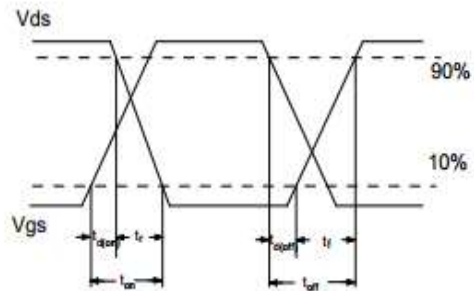
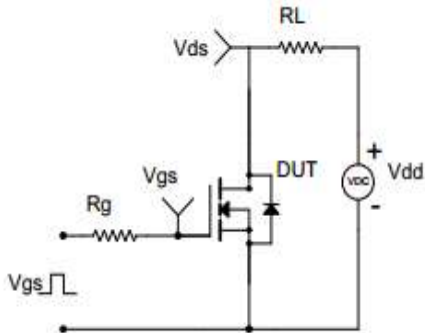


■ Test Circuit & Waveform

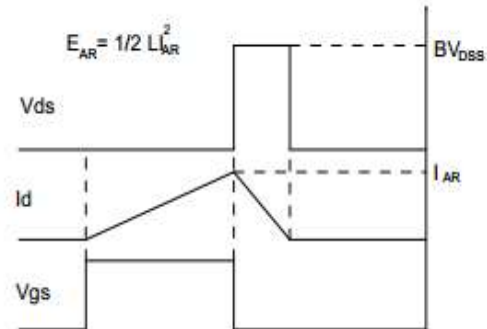
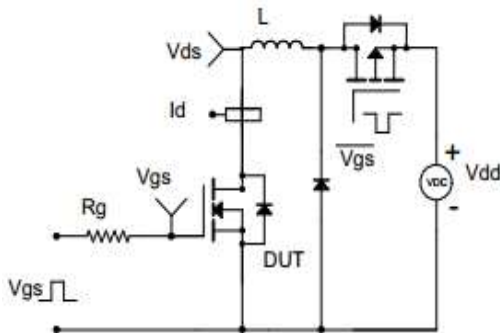
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





■ TO-247 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.60		5.15	A1	1.30		1.60
b	2.86		3.26	b1	1.86		2.26
b2		1.20		C		0.50	
D	19.00		21.00	E	15.45		15.75
E1	12.00		13.06	e		5.45	
L	14.00		14.60	L1	5.20		5.88
L2	24.00		24.40	L3	10.00		10.60
ΦP		3.50		Q	2.30		2.70

