VBGED1103 Datasheet

N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a, c]	Q_g (Typ.)
100	0.003 at V_{GS} = 10 V	180	70 nC
	0.005 at V_{GS} = 4 .5 V	160	

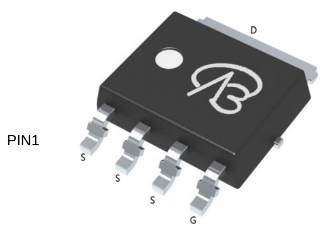
FEATURES

- SGT Power MOSFET
- 100 % R_g and UIS Tested

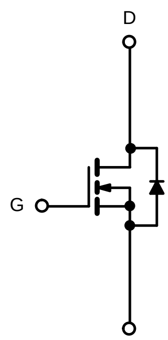
RoHS COMPLIANT

APPLICATIONS

- Synchronous Rectification
- Power Supplies



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	180[a, c]	A
	T_C = 70 °C		150[c]	
	T_A = 25 °C		30[b]	
	T_A = 70 °C		26[b]	
Pulsed Drain Current		I_{DM}	225	
Avalanche Current Pulse	L = 0.1 mH	I_{AS}	75	
Single Pulse Avalanche Energy		E_{AS}	280	mJ
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	170[a, c]	A
	T_A = 25 °C		2.6[b]	
Maximum Power Dissipation	T_C = 25 °C	P_D	405[a]	W
	T_C = 70 °C		283	
	T_A = 25 °C		3.75[b]	
	T_A = 70 °C		2.6[b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[b]	Steady State	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	Steady State	R_{thJC}	0.30	0.37	

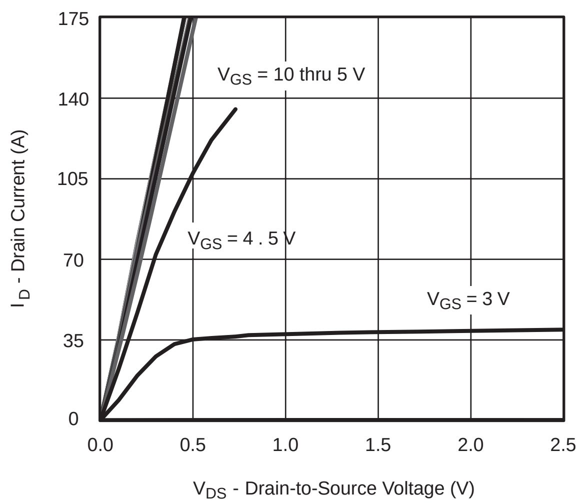
Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. Calculated based on maximum junction temperature.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		30		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 8		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1		3	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100V, V_{GS} = 0 V			1	µA
		V_{DS} = 100V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	150			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A		0.003		Ω
		V_{GS} = 4.5 V, I_D = 20 A		0.005		
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A		100		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		5000		pF
Output Capacitance	C_{oss}			460		
Reverse Transfer Capacitance	C_{rss}			100		
Total Gate Charge	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 20 A		70		nC
Gate-Source Charge	Q_{gs}			20		
Gate-Drain Charge	Q_{gd}			15		
Gate Resistance	R_g	f = 1 MHz		0.8		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1.0 Ω $I_D \cong$ 20 A, V_{GEN} = 10 V, R_g = 1 Ω		10	20	ns
Rise Time	t_r			11	15	
Turn-Off Delay Time	$t_{d(off)}$			30	60	
Fall Time	t_f			10	15	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 20 V, R_L = 1.0 Ω $I_D \cong$ 20 A, V_{GEN} = 4.5 V, R_g = 1 Ω		30		
Rise Time	t_r			22		
Turn-Off Delay Time	$t_{d(off)}$			60		
Fall Time	t_f			40		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			120	A
Pulse Diode Forward Current[a]	I_{SM}				250	
Body Diode Voltage	V_{SD}	I_S = 10 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20 A, di/dt = 100 A/µs, T_J = 25 °C		50		ns
Body Diode Reverse Recovery Charge	Q_{rr}			40	55	nC
Reverse Recovery Fall Time	t_a			20		ns
Reverse Recovery Rise Time	t_b			15		

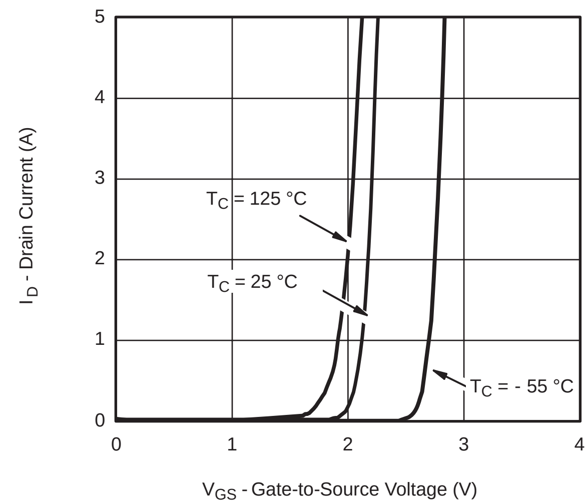
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

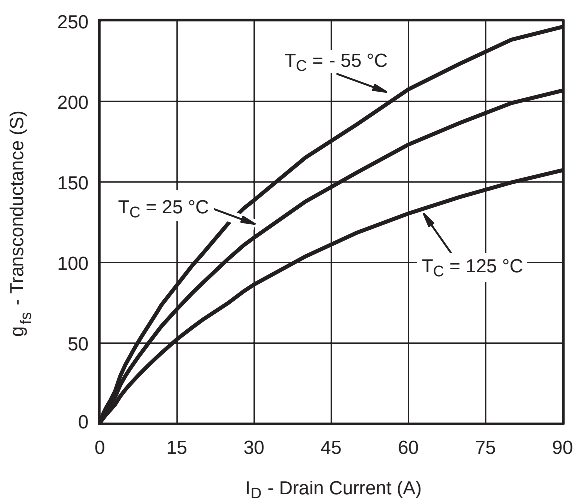
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



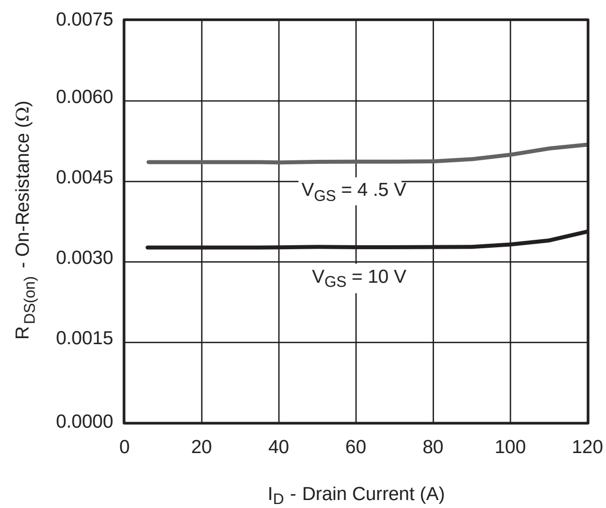
Output Characteristics



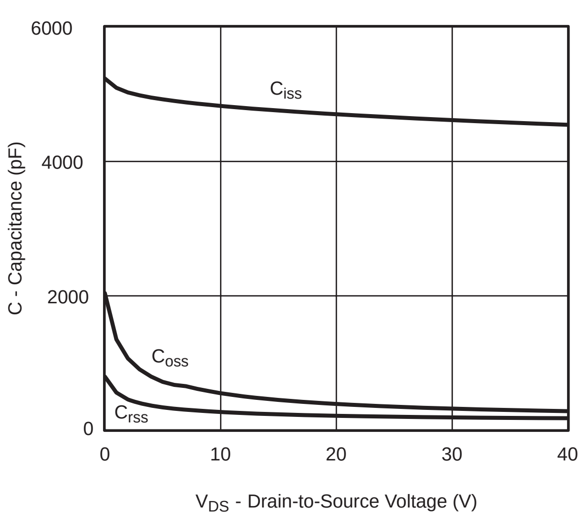
Transfer Characteristics



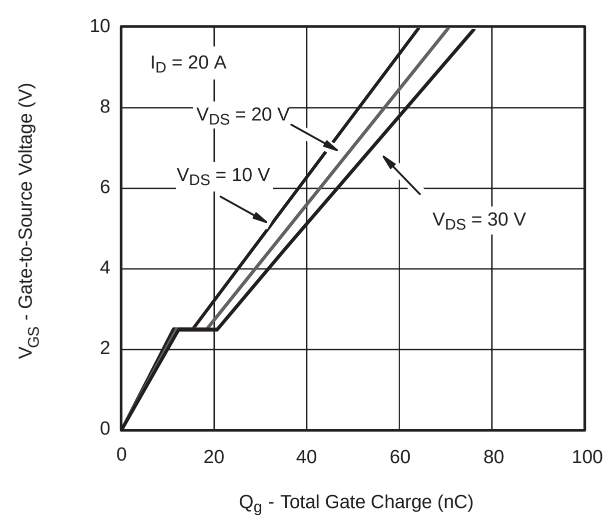
Transconductance



On-Resistance vs. Drain Current

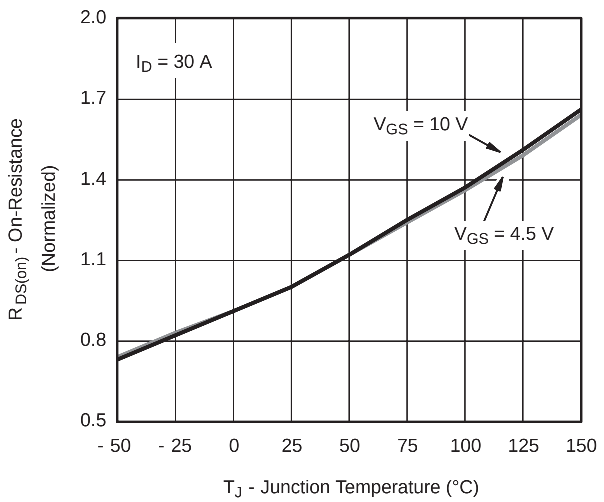


Capacitance

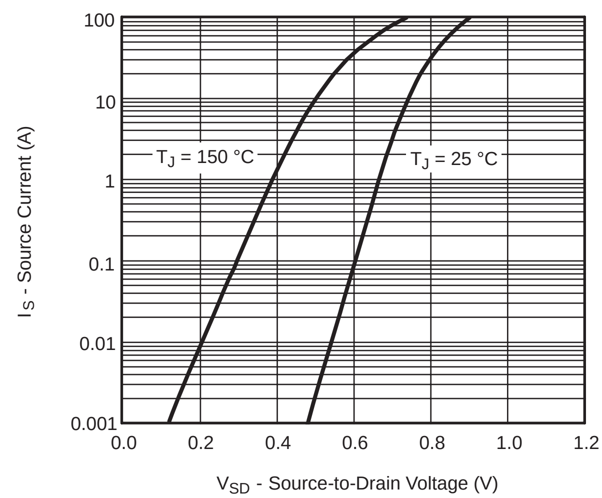


Gate Charge

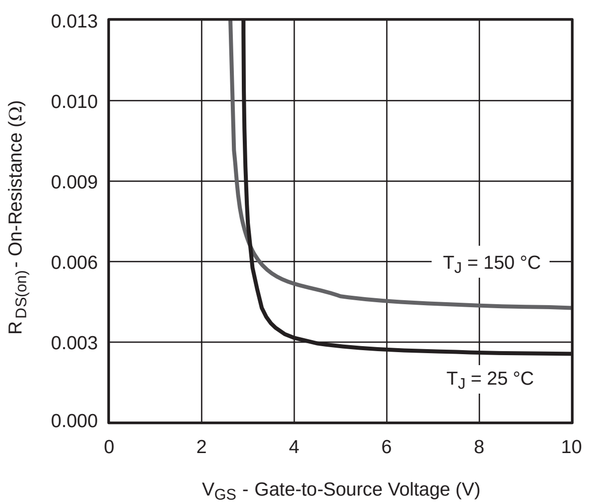
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



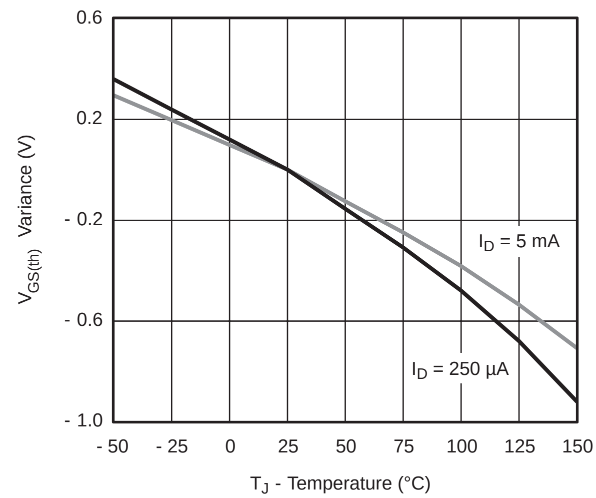
On-Resistance vs. Junction Temperature



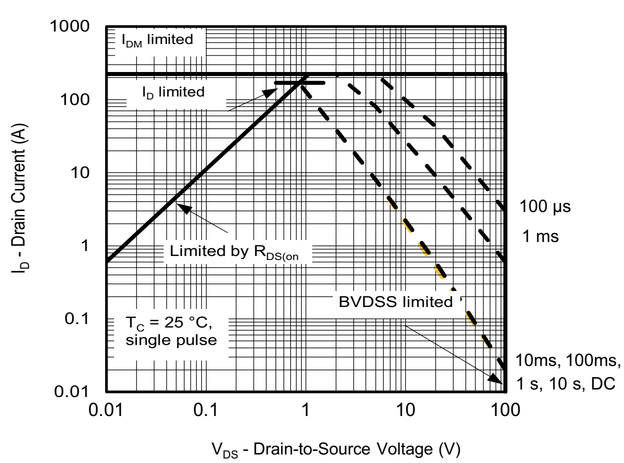
Forward Diode Voltage vs. Temperature



On-Resistance vs. Gate-to-Source Voltage



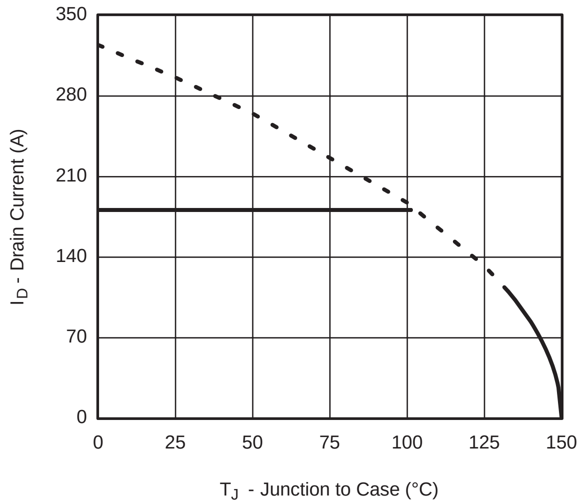
Threshold Voltage



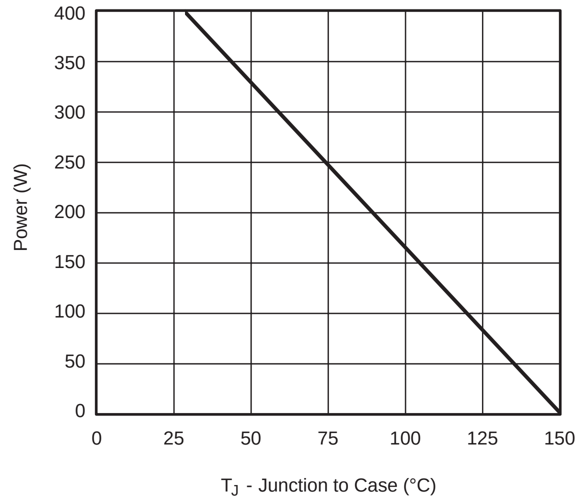
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C. unless otherwise noted

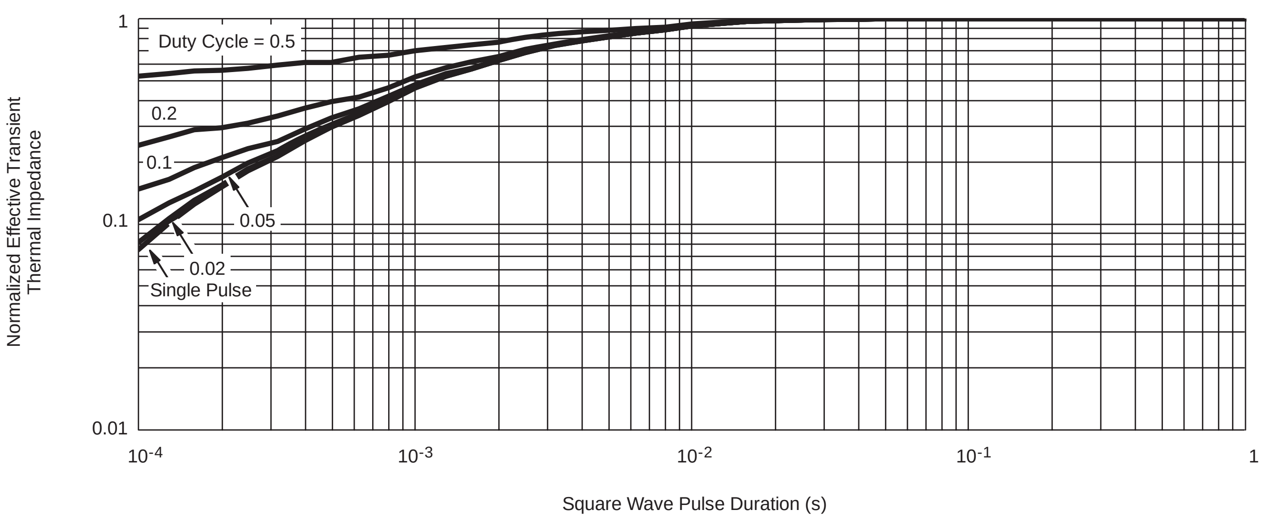


Current Derating*



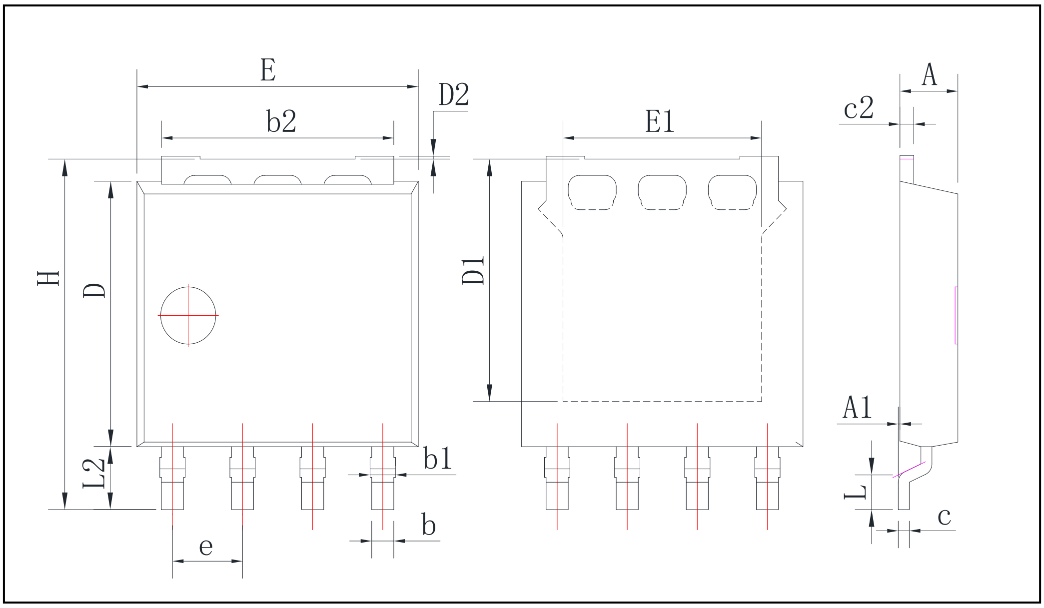
Power Derating

* The power dissipation P_D is based on T_J = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



Normalized Thermal Transient Impedance, Junction-to-Case

LFPAK56 CASE OUTLINE



Symbol	Min	Typ	Max
A	1.00	1.05	1.10
A1	0.00		0.15
b	0.35	0.40	0.50
b1	0.40	0.48	0.58
b2	4.01	4.21	4.41
c	0.18	0.20	0.25
c2	0.23	0.25	0.30
D	4.44	4.59	4.70
D1	4.10	4.24	4.40
D2			0.20
e	1.22	1.27	1.32
E	5.00	5.10	5.25
E1	3.50	3.60	3.70
H	6.05	6.15	6.25
L	0.40	0.60	0.80
L2	0.90	1.10	1.30

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