Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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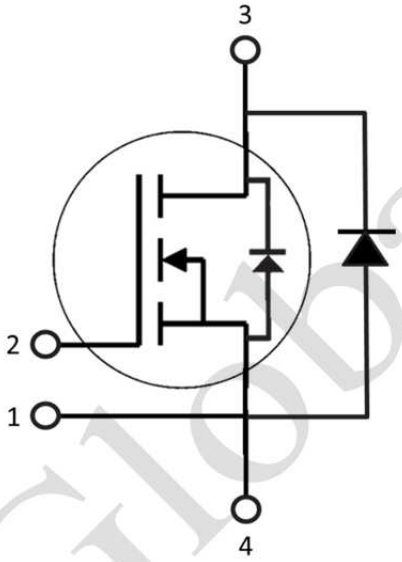
COPACK (SiC MOSFETs and SBDs)
SOT-227 Power Module

V_{CES} =1200V
I_D = 60A @T_C= 100^{0}C
R_{DS_ON}= 20 mohm @ T_J= 25^{0}C

Features

- **High speed switching SiC MOSFETs**
- Freewheeling diode with zero reverse recovery SiC SBDs
- **Low R_{DS_ON}**
- Simple to drive
- Kelvin reference for stable gate driving
- High junction temperature operation
- Positive temperature coefficient for easy to parallel mounting



Applications

- Photo Voltaic Inverter
- Aerospace actuators
- Server Power supplies
- High voltage AC/DC Converter
- Motor Drivers

RoHS

Benefits

- Outstanding power conversion efficiency at high switching frequency operation
- Low switching losses and Low EMI noises
- Very rugged and easy mount
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_F
- RoHS Compliant

Absolute Maximum Ratings (T_j=25°C unless otherwise specified)

Parameters	Symbol	Conditions	Specifications	Units
SiC MOSFETs				
Maximum Drain-Source Voltage	V_{DSS}	T_j = 25 °C~150 °C	1200	V
Continuous Drain Current	$I_{D\ (DC)}$	T_j = 25 °C, V_{GS}=20V	120	A
		T_j = 150 °C, V_{GS}=20V	80	A
Pulse Drain Current	$I_{D(Pulse)}$	Pulse width t_P limited by T_{jmax}, T_C=25 °C	160	A
Gate-Source Voltage	V_{GS}		-10/+25	V
SiC SBDs				
Maximum Reverse Voltage	V_{RRM}		1200	V
Average Forward Current	I_{DAV}	T_j = 25 °C	120	A
		T_j = 150 °C	80	A
Non-repetitive Forward Surge Current	I_{FSM}	Pulse width t_P limited by T_{jmax}	240	A
COPACK Modules Thermal Properties				
Maximum Power Dissipation	P_D	T_C = 25 °C	TBD	W
		T_C = 100 °C	TBD	W
Operating Junction Temperature	T_j		-40 ~ 150	°C
Storage Temperature	T_{STG}		-40 ~ 150	°C

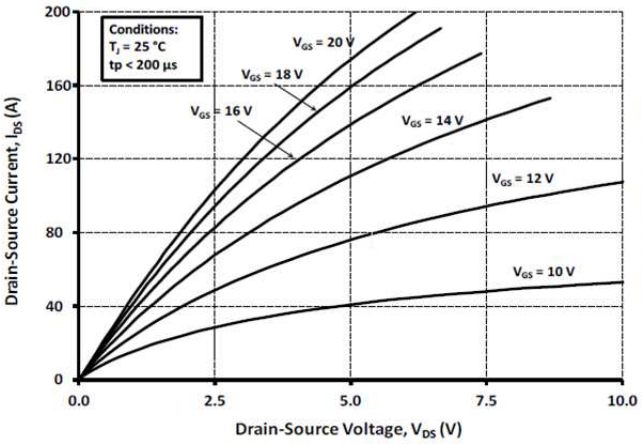
Electrical Characteristics (T_j=25°C unless otherwise specified)

Parameters	Symbol	Conditions	Min	Typ	Max	Units
SiC MOSFETs						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA	1200	--	--	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}= 10V, I_D=10mA, T_j = 25 °C	2.4	2.8	--	V
		V_{DS}= 10V, I_D=10mA, T_j = 150 °C	1.8	2.0	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V, T_j = 25 °C	--	2	200	μA
		V_{DS}=1200V, V_{GS}=0V, T_j = 150 °C	--	TBD	TBD	μA
Gate Source Leakage Current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	--	--	500	nA
Internal Gate Resistance	R_G	f = 1MHz, V_{AC} = 25mV, per die		0.9		Ω
Drain-Source On-state Resistance	$R_{DS(ON)}$	V_{GS}= 20V, I_D=80A, T_j = 25 °C	--	20	26	mΩ
		V_{GS}= 20V, I_D=80A, T_j = 150 °C	--	42	50	mΩ
Trans-conductance	g_{fs}	V_{DS}= 20V, I_D=80A, T_j = 25 °C		15		S
		V_{DS}= 20V, I_D=80A, T_j = 150 °C		13		
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = 1000V, freq = 1MHz, V_{AC} = 25mV	--	3.8	--	nF
Output Capacitance	C_{OSS}		--	300	--	pF
Reverse transfer Capacitance	C_{RES}		--	20	--	pF

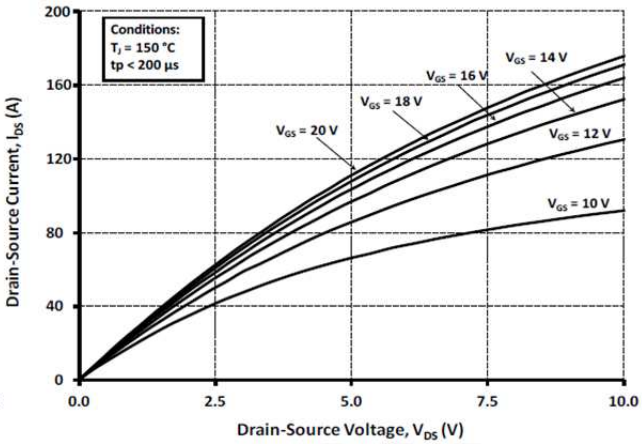
Turn-on Delay Time	$t_{d(on)}$	V_{DS} = 800V, V_{GS} = -5/20V I_D = 80A, $R_{G(ext)}$ = 1.5Ω, L = 856μH. Refer to definition	--	15	--	ns
Rise Time	t_r		--	53	--	ns
Turn-off Delay Time	$t_{d(off)}$		--	27	--	ns
Fall Time	t_f		--	35	--	ns
Turn-on Switching Loss	E_{ON}			TBD		mJ
Turn-off Switching Loss	E_{OFF}			TBD		mJ
Total Gate Charge	Q_g	V_{CE}=800 V, V_{GE} = -5/20V I_D = 80A	--	230	--	nC
SiC SBDs						
Maximum peak repetitive reverse voltage	V_{RRM}		1200	--	--	V
Maximum Reverse Leakage Current	I_{RM}	V_R = 1200V, T_j = 25 ^{0}C	--	16	500	μA
		V_R = 1200V, T_j = 150 ^{0}C	--	350	--	μA
Diode Forward Voltage	V_F	I_F = 60A, T_j = 25 ^{0}C	--	1.6	1.8	V
		I_F = 60A, T_j = 150 ^{0}C	--	2.1	2.6	V
Total Capacitive Charge	Q_C	V_R=1200 V, I_F<$I_{F,max}$, dI_F/dt = 500 A/μs, T_j = 25 ^{0}C	--	208	--	nC
Switching Time	t_C	dI_F/dt = 500 A/μs, T_j = 25 ^{0}C	--	--	10	ns
Total Capacitance	C	V_R = 1V, f = 1 MHz	--	3809	--	pF
		V_R = 600V, f = 1 MHz	--	222	--	pF
		V_R = 1200V, f = 1 MHz	--	216	--	pF

Thermal and Package Characteristics (T_j=25^{o}C unless otherwise specified)

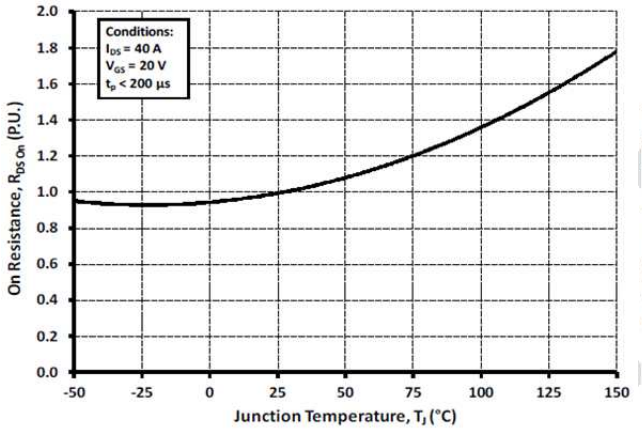
Parameters	Symbol	Conditions	Min	Typ	Max	Units
Junction to Case Thermal Resistance	R_{THJC}	MOSFET (per die)	--	--	0.3	^{0}C /W
		SBD (per die)	--	--	0.2	^{0}C /W
		Per Module	--	--	TBD	^{0}C /W
Junction to Ambient Thermal Resistance	R_{THJA}	Per MOSFET	--	--	TBD	^{0}C /W
		Per SBD	--	--	20	^{0}C /W
		Per Module	--	--	TBD	^{0}C /W
Mounting Torque	M_d				1.5	N-m
Terminal Connection Torque	M_{dt}		1.3	--	1.5	N-m
Package Weight	W_t			32		g
Isolation Voltage	V_{ISOL}	I_{ISOL} < 1mA, 50/60Hz, t=1 min	2500			V



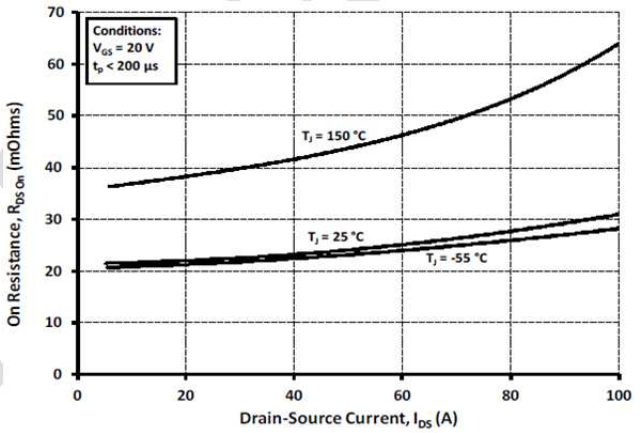
Typical Forward Characteristics T_j=25 °C



Typical Forward Characteristics T_j=25 °C



Normalized $R_{DS\ ON}$ vs. Temperature



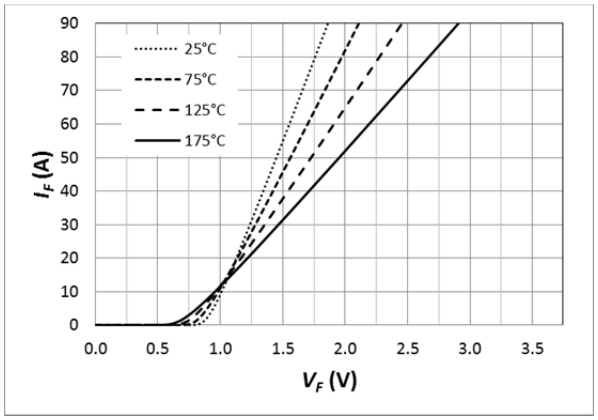
$R_{DS\ ON}$ vs. Drain Current

TBD

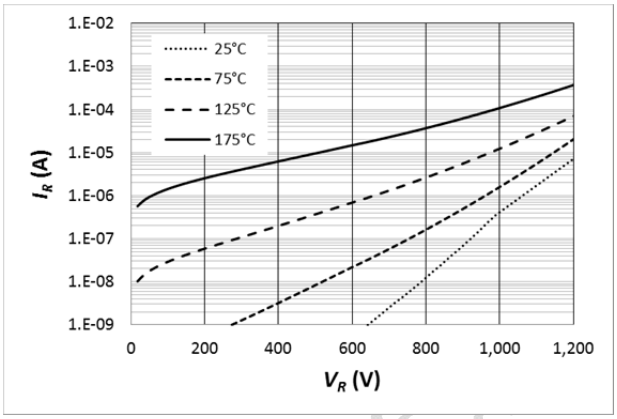
Switching Loss vs. Drain Current

TBD

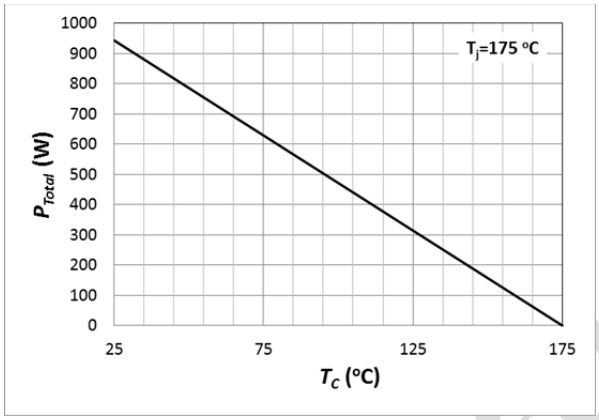
Switching Loss vs. Gate Resistance



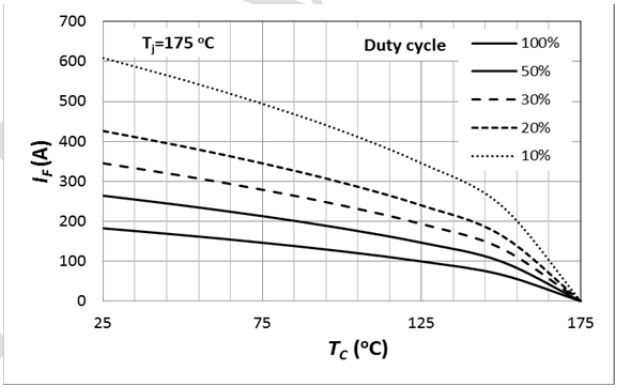
Forward Characteristics (parameterized on Tj)



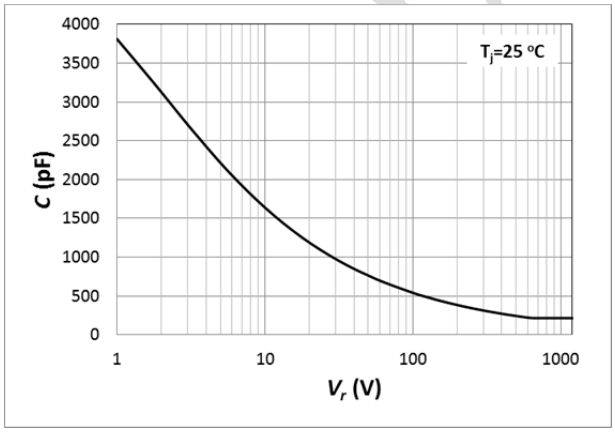
Reverse Characteristics (parameterized on Tj)



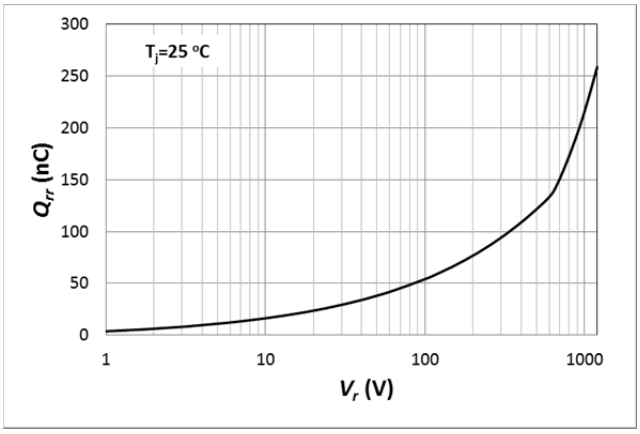
Power Derating



Current Derating



Capacitance Curve



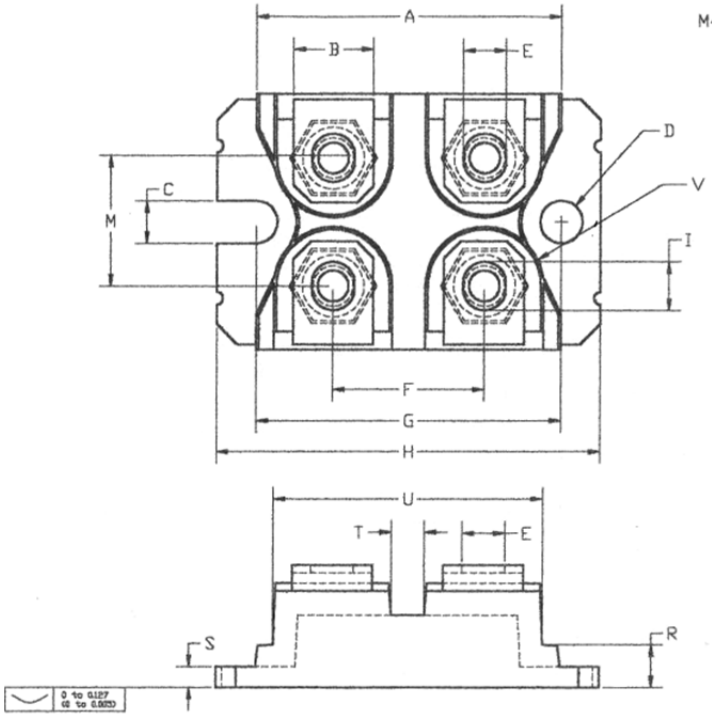
Recovery Charge

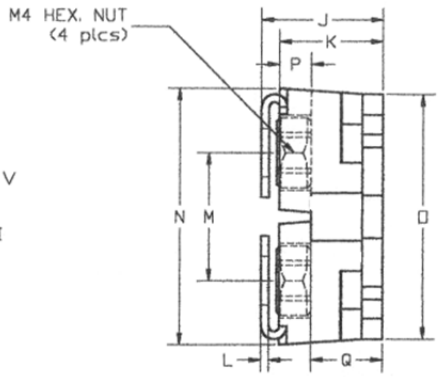
Part Number and Pin assignment

Part Number	Rating	Pin 1*	Pin 2	Pin 3	Pin 4*
GCMS020A120S1-E1	1200V, R_{ds_ON}=20 mohm	Source	Gate	Drain	Source

* pin 1 could be used as a kelvin reference terminal, and pin 4 is assigned for main source power terminal.

SOT-227 Package Outline and Dimension





DIM.	MILLIMETER		INCHES	
	Min.	Max.	Min.	Max.
A	31.67	31.90	1.247	1.256
B	7.95	8.18	0.313	0.322
C	4.14	4.24	0.163	0.167
D	4.14	4.24	0.163	0.167
E	4.14	4.24	0.163	0.167
F	14.94	15.09	0.588	0.594
G	30.15	30.25	1.187	1.191
H	38.00	38.10	1.496	1.500
I	4.75	4.83	0.187	0.190
J	11.76	12.19	0.463	0.480
K	9.45	9.60	0.372	0.378
L	0.76	0.84	0.030	0.033
M	12.62	12.88	0.497	0.507
N	25.15	25.30	0990	0.996
O	24.79	25.04	0.976	0.986
P	2.74	3.15	0.108	0.124
Q	6.91	6.99	0.272	0.275
R	4.17	4.42	0.164	0.174
S	2.08	2.13	0.082	0.084
T	3.28	3.63	0.129	0.143
U	26.75	26.90	1.053	1.059
V	3.94	4.04	0.155	0.159

Revision History

Date	Revision	Notes
02/04/2016	0.1	Initial release

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Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

- **REACh Compliance**
  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemi- cal Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
  REACh banned substance information (REACh Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.

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