

CMHG120R040-4

1200V, 42mΩ typ., 60A N-Channel Silicon Carbide Power MOSFET

General Description

This silicon carbide Power MOSFET device has been developed using Cmos's advanced SiC MOSFET technology. The device features a very low $R_{DS(on)}$ over the entire temperature range combined with low capacitances and very high switching operations, which improve application performance in frequency, energy efficiency, system size and weight reduction.

Features

- 100% Avalanche Tested
- High switching speed with a low gate charge
- Fast intrinsic diode with low reverse recovery
- RoHS Compliant

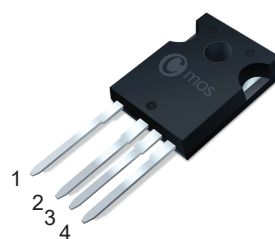
Product Summary

BVDSS	$R_{DS(on)}$ max.	ID
1200V	56mΩ	60A

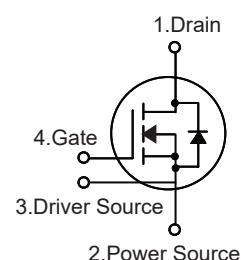
Applications

- inverter
- EV charging infrastructure
- uninterruptable power supplies

TO-247-4 Pin Configuration



TO-247-4
CMHG120R040-4



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	1200	V
V_{GS}	Absolute maximum values	-10/+22	V
V_{GSop}	Recommended operational values	-5/+18	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current	60	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current	43	A
I_{DM}	Pulsed Drain Current	160	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation	320	W
T_{STG}	Storage Temperature Range	-55 to 175	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 175	$^{\circ}C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient	---	40	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case	---	0.47	$^{\circ}C/W$

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Electrical Characteristics (T_J=25°C , unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =1mA	1200	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =18V, I _D =30A	---	42	56	mΩ
		V _{GS} =18V, I _D =30A, T _J =175°C	---	65	---	
		V _{GS} =15V, I _D =30A	---	55	---	
		V _{GS} =15V, I _D =30A, T _J =175°C	---	80	---	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =10mA (tested after V _{GS} =22V, 1ms pulse)	2.0	3.0	5.0	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =1200V, V _{GS} =0V	---	1	100	μA
		V _{DS} =1200V, V _{GS} =0V, T _J =175°C	---	10	---	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =+22V, V _{DS} =0V	---	---	+250	nA
		V _{GS} =-10V, V _{DS} =0V	---	---	-250	
g _{fs}	Forward Transconductance	V _{DS} =20V, I _D =30A	---	6.1	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	3.5	---	Ω
Q _{g(tot)}	Total Gate Charge	V _{DS} =800V, I _D =30A V _{GS} =-5V to 18V	---	104	---	nC
Q _{gs}	Gate-Source Charge		---	27	---	
Q _{gd}	Gate-Drain Charge		---	34	---	
E _{oss}	Stored Energy in Output Capacitance	V _{GS} =0V, V _{DS} =0V to 800V	---	51	---	μJ
C _{o(er)}	Energy Related Output Capacitance		---	160	---	pF
C _{o(tr)}	Time Related Output Capacitance		---	261	---	
E _{on}	Turn-on Switching Energy	V _{DS} =800V I _D =30A V _{GS} =-5V / 18V R _G =2Ω FWD = 1200V 20A SiC Diode Inductive load	---	210	---	μJ
E _{off}	Turn-off Switching Energy		---	98	---	
E _{tot}	Total Switching Energy		---	308	---	
T _{d(on)}	Turn-On Delay Time		---	20	---	ns
T _r	Rise Time		---	15	---	
T _{d(off)}	Turn-Off Delay Time		---	37	---	
T _f	Fall Time		---	8	---	
C _{iss}	Input Capacitance	V _{DS} =800V, V _{GS} =0V, f=250kHz	---	1970	---	pF
C _{oss}	Output Capacitance		---	125	---	
C _{rss}	Reverse Transfer Capacitance		---	9	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	60	A
I _{SM}	Pulsed Source Current		---	---	160	A
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =30A, T _J =25°C	---	4.2	---	V
t _{rr}	Reverse Recovery Time	di/dt=3000A/μs, Includes Q _{oss}	---	16	---	ns
Q _{rr}	Reverse Recovery Charge	V _{DD} =800V, I _{SD} =30A, T _J =25°C	---	240	---	nC

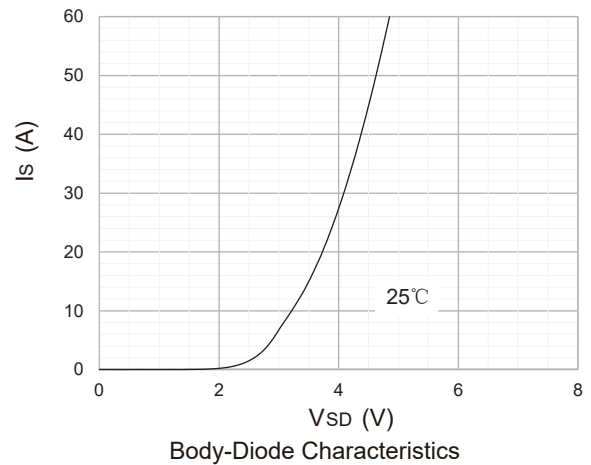
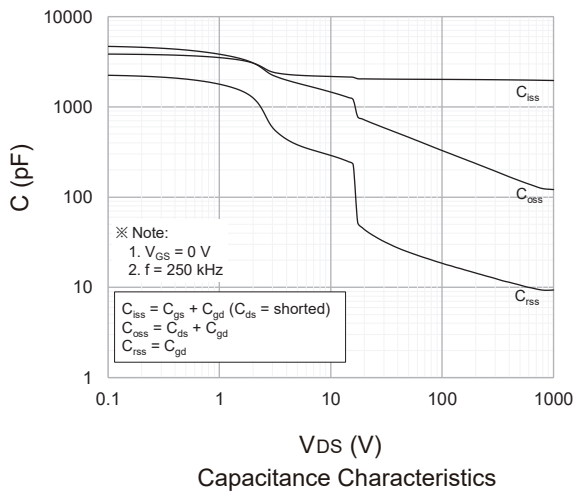
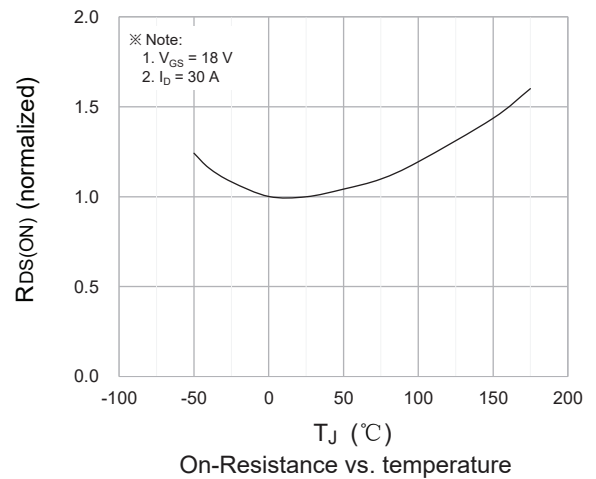
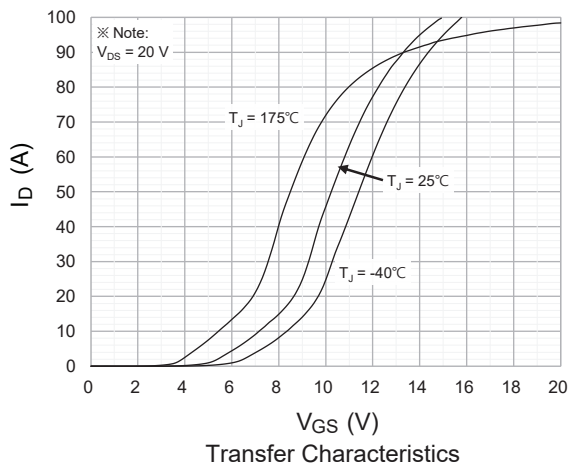
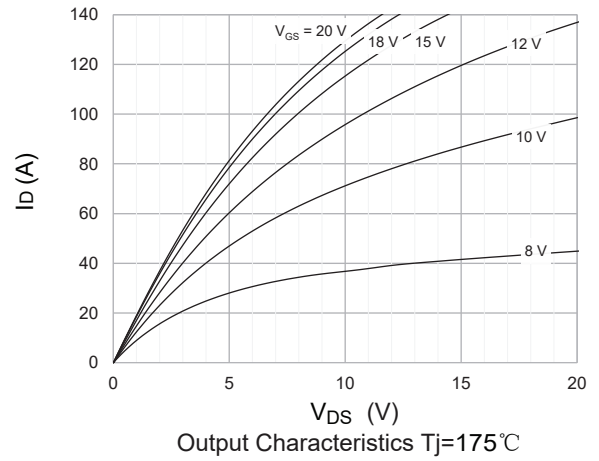
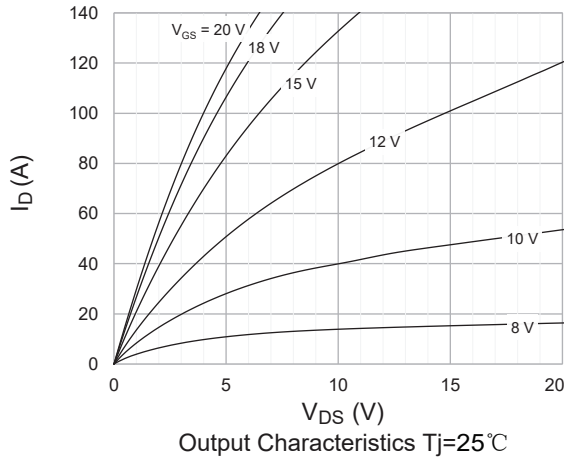
Note :

This product has been designed and qualified for the consumer market.

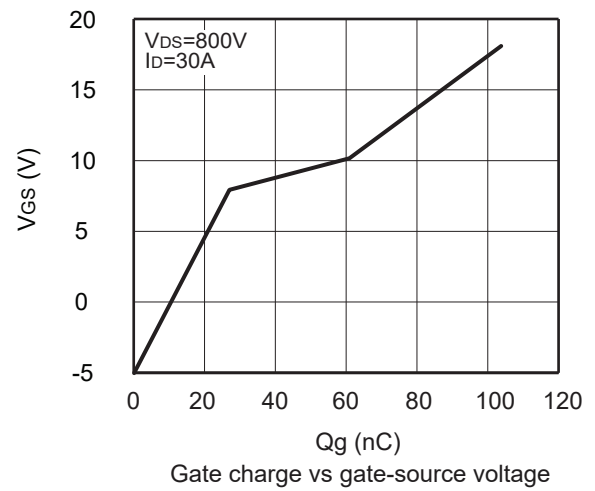
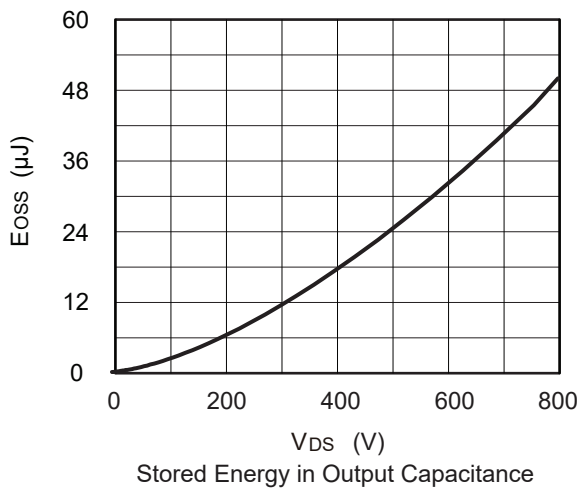
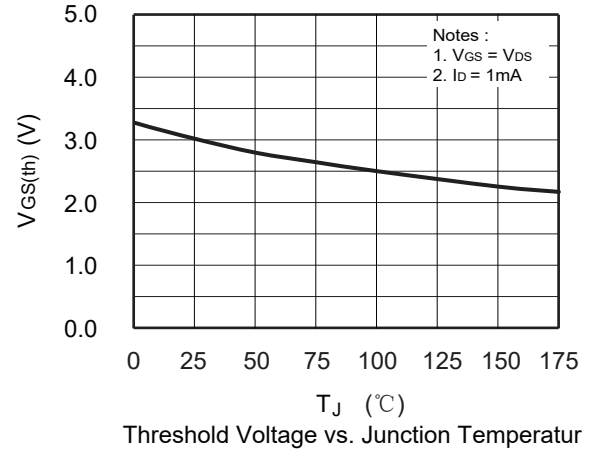
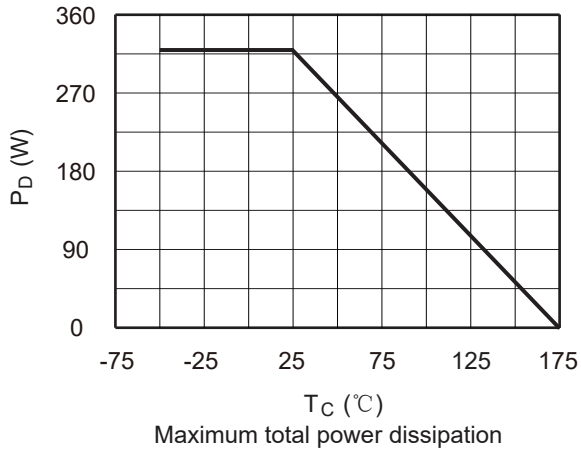
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Cmos reserves the right to improve product design, functions and reliability without notice. Please refer to the latest version of specification.

Typical Characteristics



Typical Characteristics



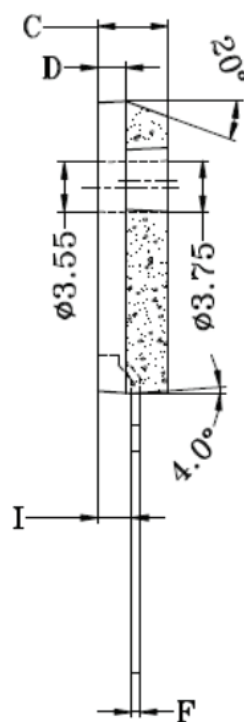
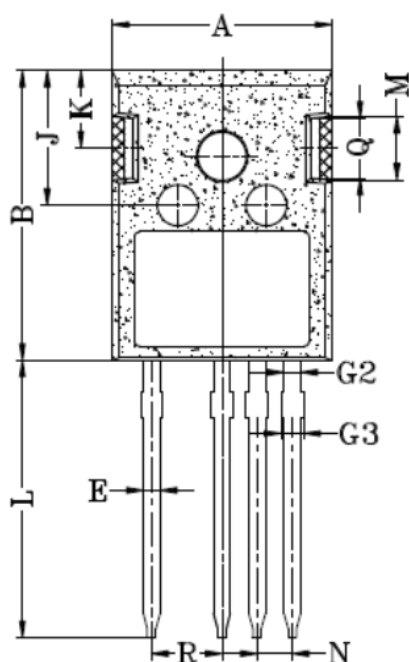
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Package Dimension

TO-247-4

Unit :mm



Symbol	Dimensions in Millimeter	
	MIN	MAX
A	15.80	16.00
B	20.90	21.10
C	4.90	5.10
D	1.90	2.10
E	1.10	1.30
F	0.50	0.70
G2	1.10	1.30
G3	1.18	1.38
H	4.18	4.38
I	2.30	2.50
J	9.65	9.85
K	5.54	5.74
L	19.80	20.20
M	4.50	4.70
N	2.34	2.74
Φ P	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

