CMSC12NP04

N&P-Channel Enhancement Mode MOSFET

General Description

The CMSC12NP04 is the highest performance trench N-ch and P-ch MOSFETs with high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

Product Summary

	BVDSS	$R_{DS(on)}$ max.	ID
N-Channel	40V	25mΩ	20A
P-Channel	-40V	48mΩ	-12A

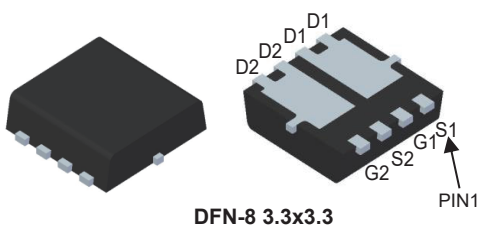
Applications

- Synchronous Rectification.
- High Current, High Speed Switching.
- Protable equipment application

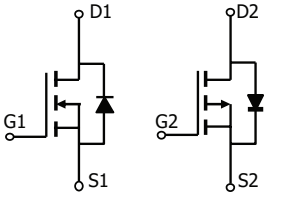
Features

- N Channel+P Channel
- Low On-Resistance
- Surface Mount Package
- RoHS Compliant

DFN-8 3.3x3.3 Pin Configuration



DFN-8 3.3x3.3



N-channel P-channel

Type	Package	Marking
CMSC12NP04	DFN-8 3.3x3.3	12NP04

Absolute Maximum Ratings

Symbol	Parameter	Max N-channel	Max P-channel	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25℃	Continuous Drain Current	20	-12	A
I_D@T_C=100℃	Continuous Drain Current	13	-8.4	A
I_{DM}	Pulsed Drain Current	60	-36	A
EAS	Single Pulse Avalanche Energy [1]	56	56	mJ
P_D@T_C=25℃	Power Dissipation	24	20	W
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃

Thermal Characteristics: N-channel

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient	---	53	℃/W
$R_{\theta JC}$	Maximum Junction-to-Case	---	5.1	℃/W

Thermal Characteristics: P-channel

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient (t≤10s)	---	50	℃/W
$R_{\theta JC}$	Maximum Junction-to-Case	---	6.2	℃/W

Electrical Characteristics (T_J=25℃ , unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=6A	---	20	25	mΩ
		V_{GS}=4.5V , I_D=6A	---	25	35	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D = 250μA	1	---	3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=32V , V_{GS}=0V	---	---	1	uA
		V_{DS}=32V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±20V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V, I_D=6A	---	10	---	S
Q_g	Total Gate Charge	V_{DS}=20V , I_D=7A V_{GS}=0 to 10V	---	14	---	nC
Q_{gs}	Gate-Source Charge		---	2	---	
Q_{gd}	Gate-Drain Charge		---	2.5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=20V , V_{GS}=10V , R_G=6Ω I_D =7A	---	7	---	ns
T_r	Rise Time		---	3	---	
$T_{d(off)}$	Turn-Off Delay Time		---	20	---	
T_f	Fall Time		---	2	---	
C_{iss}	Input Capacitance	V_{DS}= 25V, V_{GS}=0V , f=1MHz	---	850	---	pF
C_{oss}	Output Capacitance		---	85	---	
C_{rss}	Reverse Transfer Capacitance		---	50	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Diode continuous forward current	V_G=V_D=0V , Force Current	---	---	20	A
$I_{S,pulse}$	Diode pulse current		---	---	60	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_F=12A , Tj=25℃	---	0.9	1.2	V

P Channel Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250μA	-40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-6A	---	40	48	mΩ
		V_{GS}=-4.5V , I_D=-6A	---	51	61	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250μA	-1	---	-3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-40V , V_{GS}=0V	---	---	-1	uA
		V_{DS}=-40V , V_{GS}=0V,T_J=55℃	---	---	-10	
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-6A	---	11	---	S
Q_g	Total Gate Charge	V_{DS}=-20V, V_{GS}=-4.5V, I_D=-5A	---	11	---	nC
Q_{gs}	Gate-Source Charge		---	3	---	
Q_{gd}	Gate-Drain Charge		---	5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DS}=-20V , V_{GS}=-10V, I_D =-4A R_G=1Ω , R_L=5Ω	---	6	---	ns
T_r	Rise Time		---	13	---	
$T_{d(off)}$	Turn-Off Delay Time		---	26	---	
T_f	Fall Time		---	10	---	
C_{iss}	Input Capacitance	V_{DS}=-25V , V_{GS}=0V , f=1MHz	---	1050	---	pF
C_{oss}	Output Capacitance		---	90	---	
C_{rss}	Reverse Transfer Capacitance		---	55	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-12	A
I_{SM}	Pulsed Source Current		---	---	-36	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_F=-12 A ,T_J=25℃	---	-0.97	-1.2	V

Note:

1.The EAS data shows Max. rating . The N-Channel test condition is V_{DD}=30V , V_{GS}=10V , L=0.5mH , I_{AS}=15A.

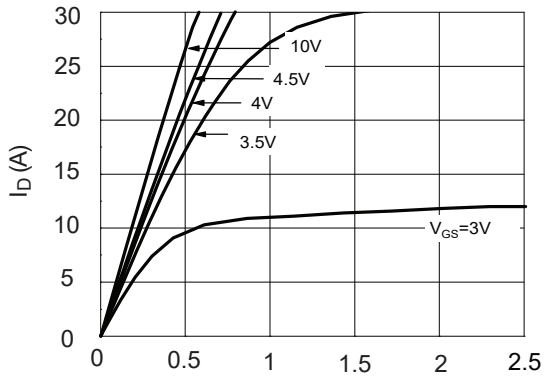
The P-Channel test condition is V_{DD}=-30V , V_{GS}=-10V , L=0.5mH , I_{AS}=-15A.

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

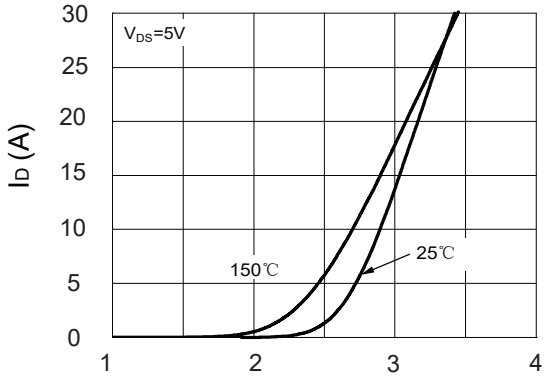
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Cmos reserver the right to improve product design ,functions and reliability wihtout notice.Please refer to the latest version of specification.

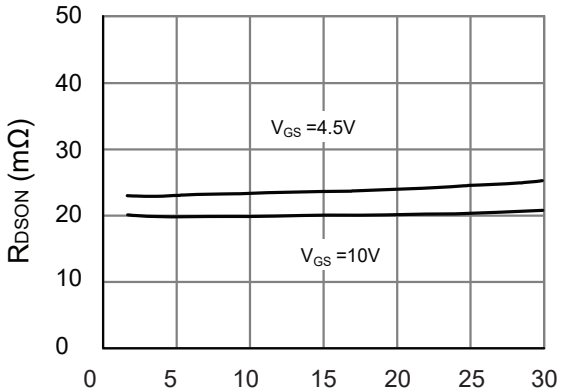
Typical Characteristics:N-Channel



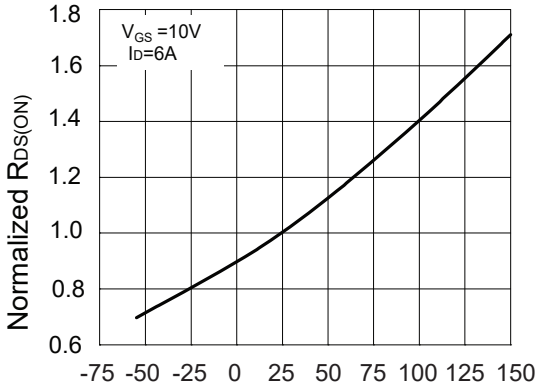
Output Characteristics



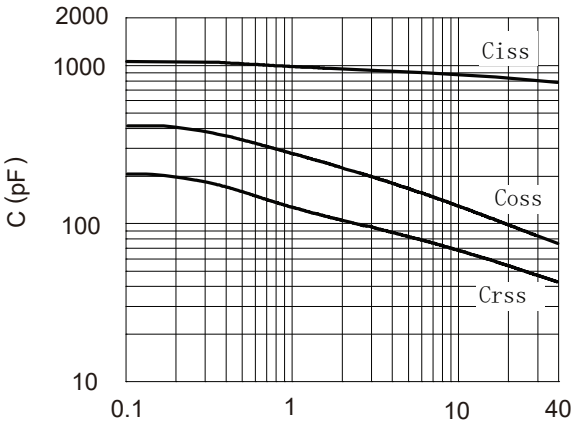
transfer characteristics



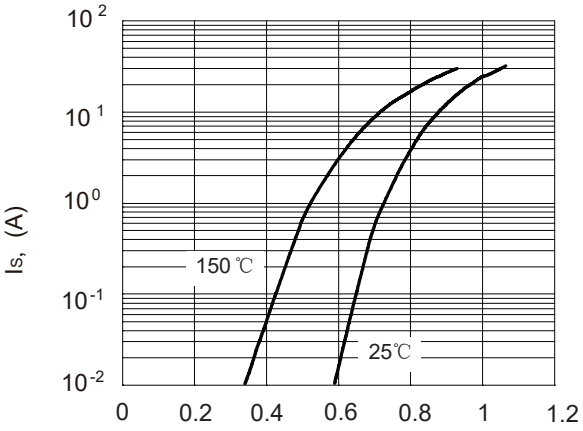
drain-source on-resistance



On-Resistance vs. Junction Temperature

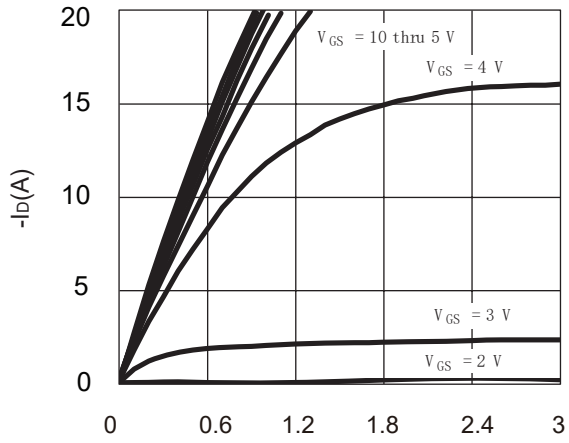


Capacitance Characteristics

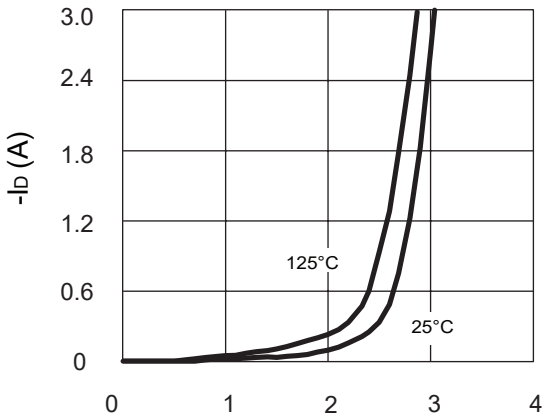


Body-Diode Characteristics

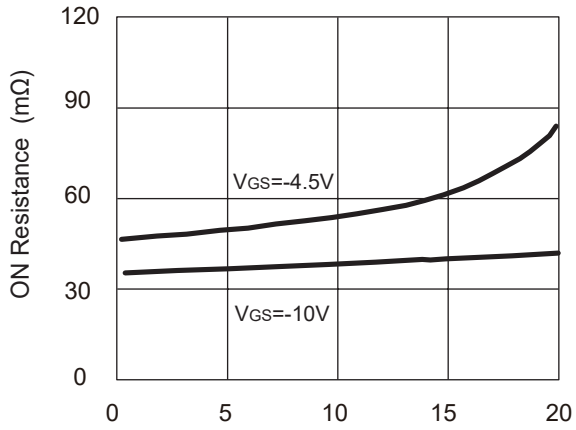
Typical Characteristics:P-Channel



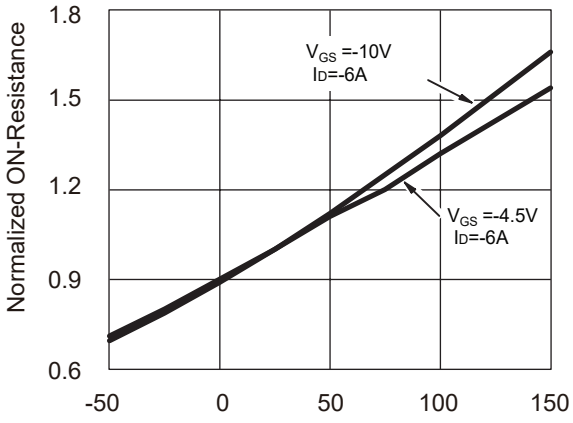
Output Characteristics



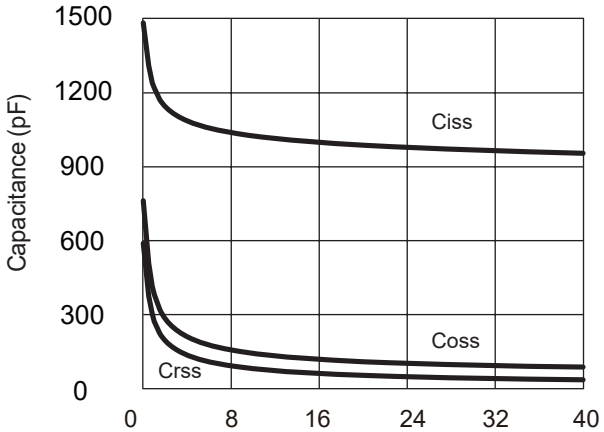
transfer characteristics



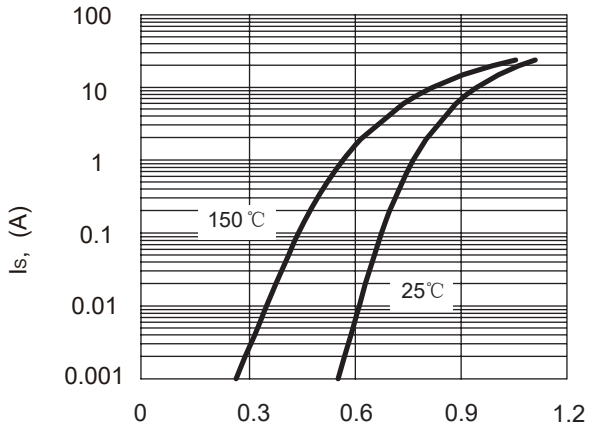
Resistance V.S Drain Current



On-Resistance vs. Junction Temperature



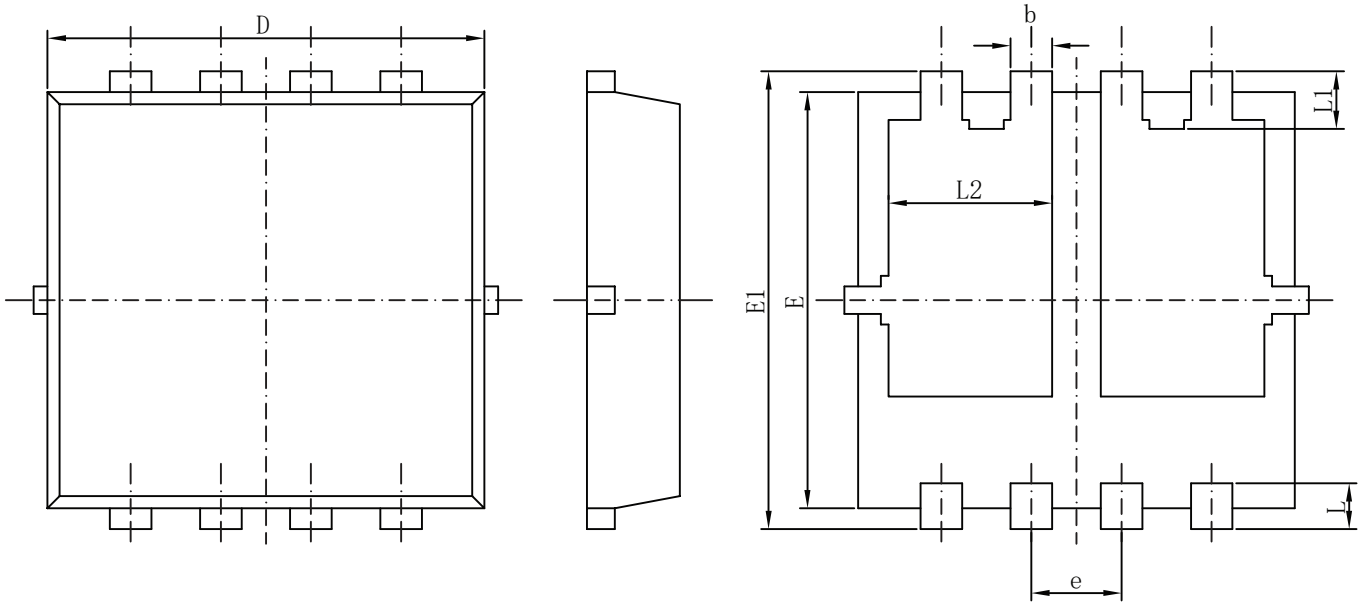
Capacitance Characteristics

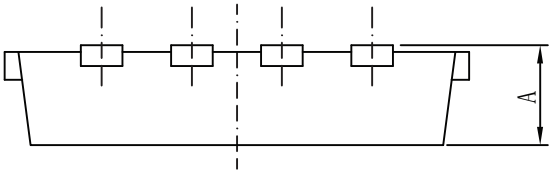


Body-Diode Characteristics

Package Dimension

DFN-8 3.3x3.3 Unit :mm





Dimensions In Millimeters			
Symbol	Min.	Max.	Ave.
A	0.700	0.900	0.800
D	3.000	3.200	3.100
E	3.000	3.200	3.100
E1	3.200	3.600	3.400
b	0.200	0.400	0.300
e	0.550	0.750	0.650
L	0.300	0.600	0.450
L1	0.395	0.695	0.545
L2	0.885	1.185	1.035

注：
1.未注公差±0.10
2.塑封体无缺损、缩孔、裂纹、气泡等不良缺陷
3.标注单位mm