

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

20N04-MS

Product specification

Description

The 20N04-MS is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 20N04-MS meet the RoHS and Green Product requirement, 100% EAS guaranteed with full

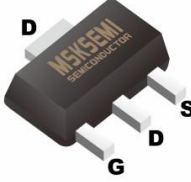
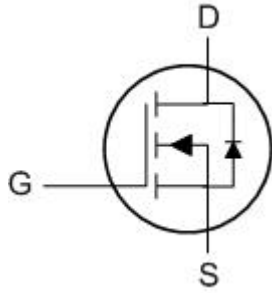
Product Summary

BVDSS	40V
RDSON	15mΩ
ID	20A

FEATURE

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Reference News

PACKAGE OUTLINE	PIN CONFIGURATION	Marking
 SOT-89		

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ 10V ¹	20	A
I _D @T _A =100°C	Continuous Drain Current, V _{GS} @ 10V ¹	15	A
I _{DM}	Pulsed Drain Current ²	40	A
EAS	Single Pulse Avalanche Energy ³	17.1	mJ
I _{AS}	Avalanche Current	10	A
P _D @T _A =25°C	Total Power Dissipation ⁴	4	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	2.8	°C/W

N-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = 10V, I _D =8A	-	15	20	mΩ
		V _{GS} =4.5V, I _D =5A	-	18	25	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f= 1.0MHz	-	633	-	pF
C _{oss}	Output Capacitance		-	67	-	pF
C _{rss}	Reverse Transfer Capacitance		-	58	-	pF
Q _g	Total Gate Charge	V _{DS} =20V, I _D =8A, V _{GS} = 10V	-	12	-	nC
Q _{gs}	Gate-Source Charge		-	3.2	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	3.1	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = 20V, R _L =2.5Ω V _{GS} = 10V,R _{REN} =3Ω	-	4	-	ns
t _r	Turn-on Rise Time		-	3	-	ns
t _{d(off)}	Turn-off Delay Time		-	15	-	ns
t _f	Turn-off Fall Time		-	2	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _s	Maximum Continuous Drain to Source Diode Forward Current		-	-	35	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _s = 8A	-	-	1.2	V

Typical Performance Characteristics-N

Figure1: Output Characteristics

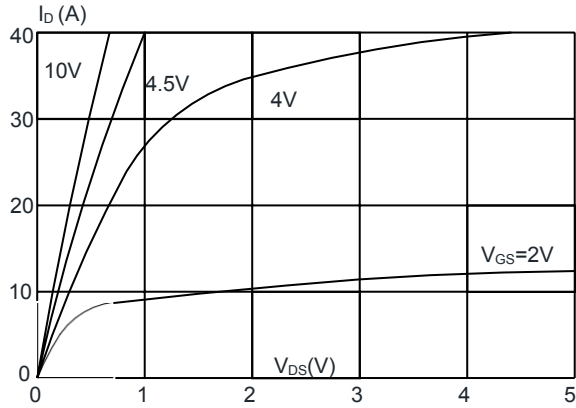


Figure 2: Typical Transfer Characteristics

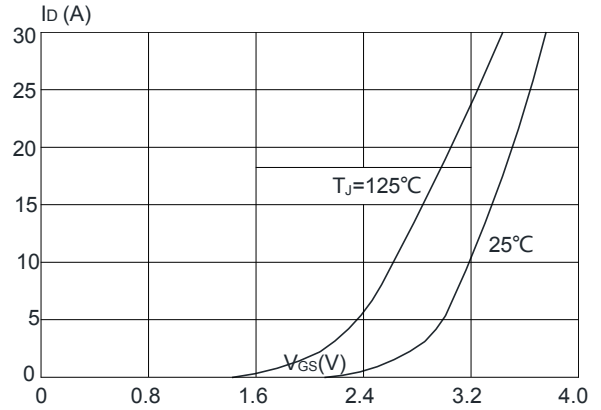


Figure 3: On-resistance vs. Drain Current

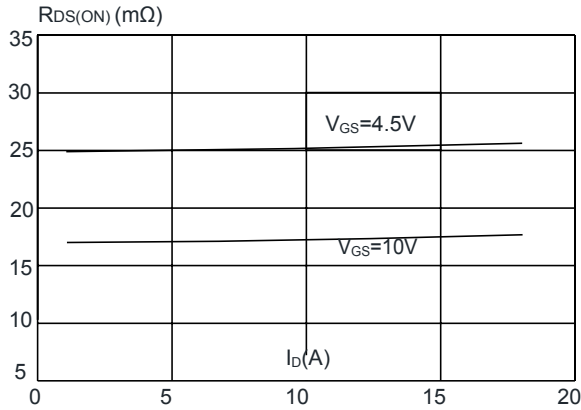


Figure 4: Body Diode Characteristics

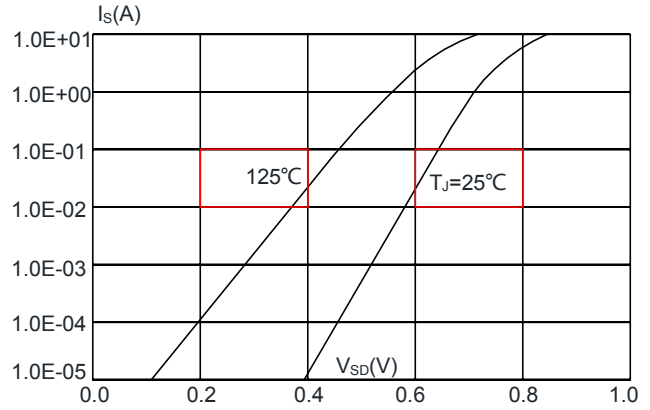


Figure 5: Gate Charge Characteristics

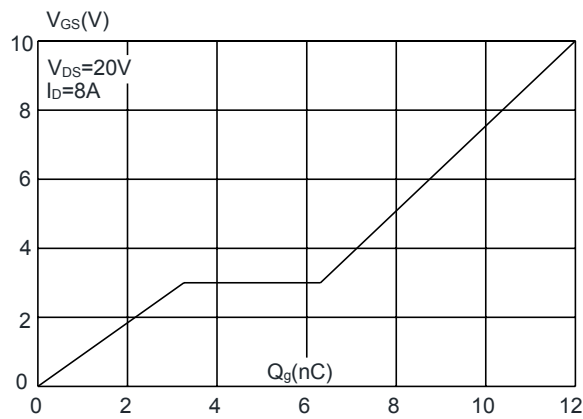


Figure 6: Capacitance Characteristics

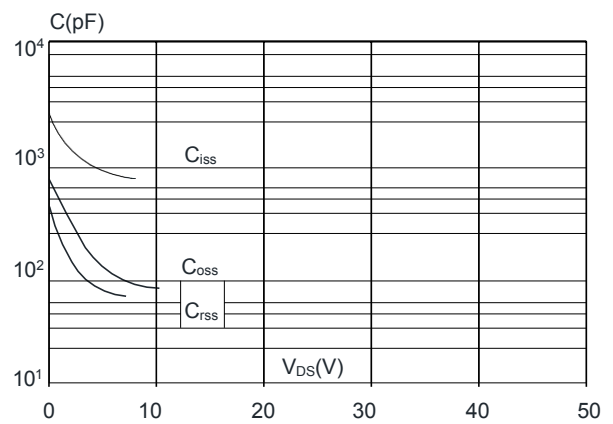


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

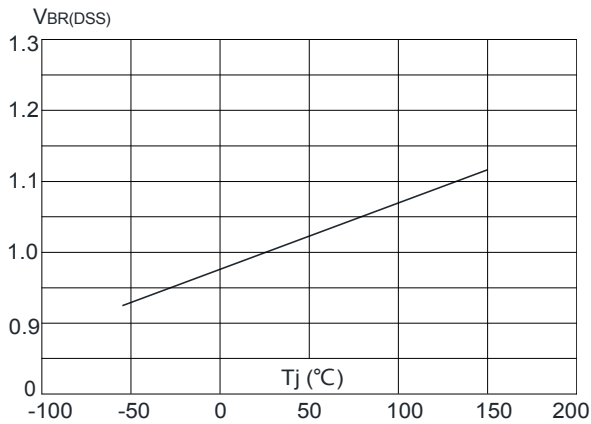


Figure 8: Normalized on Resistance vs. Junction Temperature

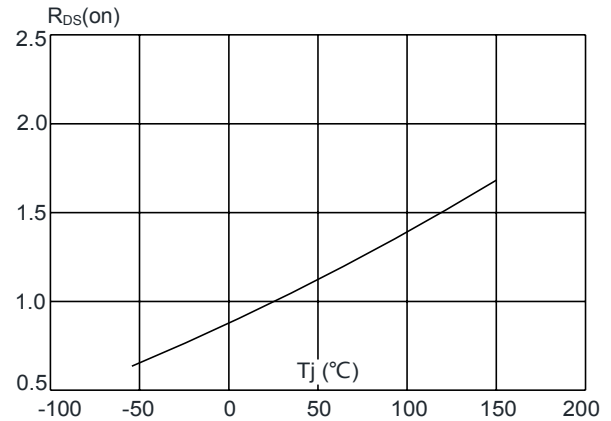


Figure 9: Maximum Safe Operating Area

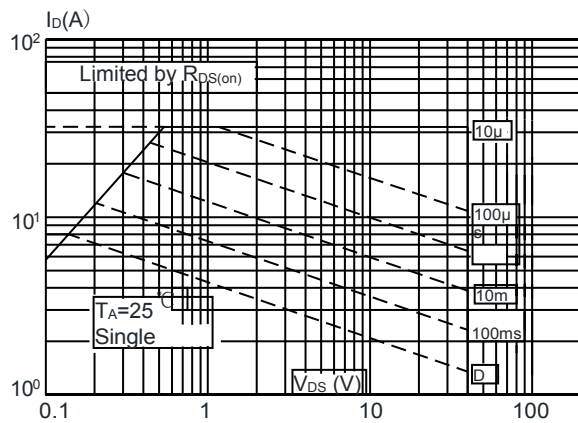


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

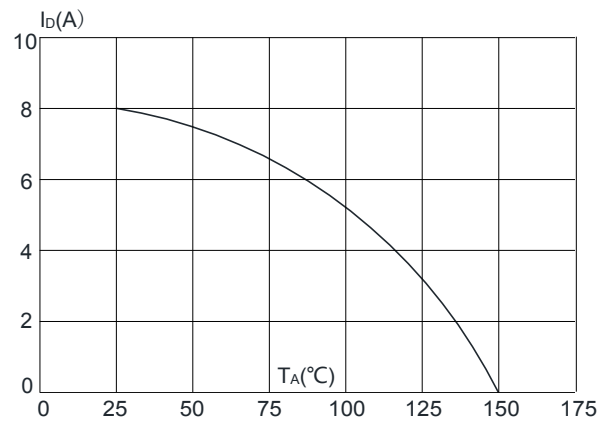
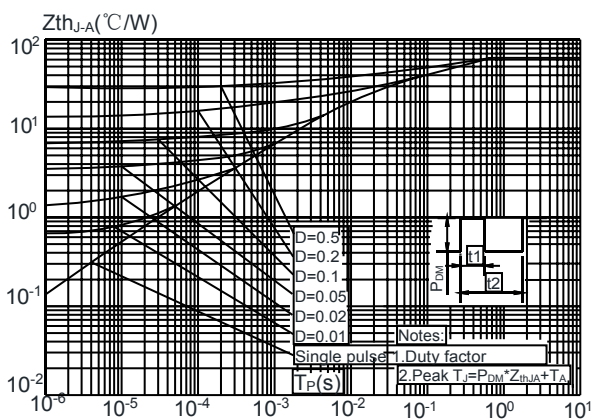
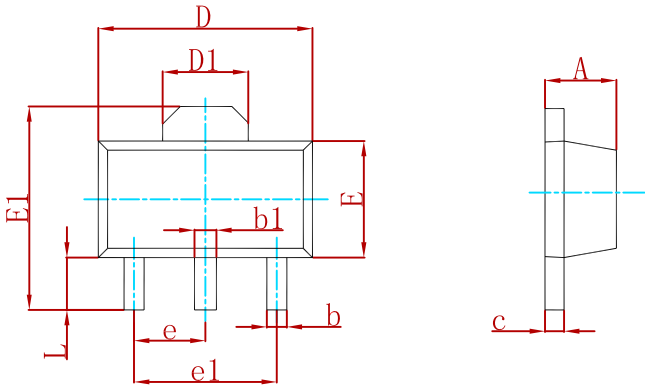


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

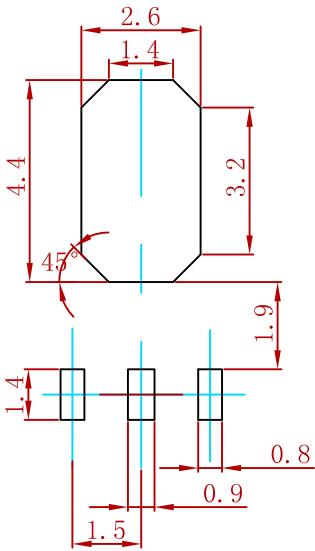


PACKAGE MECHANICAL DATA



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

REEL SPECIFICATION

P/N	PKG	QTY
20N04-MS	SOT-89	1000

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