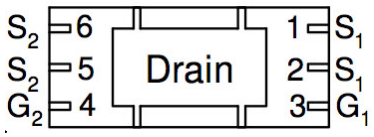
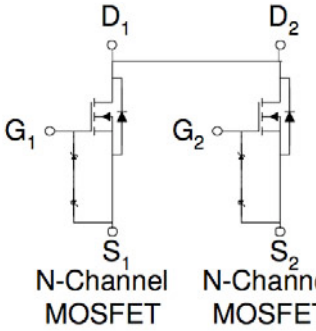
MS9N20E

DFN 2X5 6PP

Dual N-Channel 20-V (D-S) MOSFET

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low RDS (on) and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.





Pb-free
RoHS COMPLIANT
HALOGEN FREE

Key Features:

- Low rDS(on) provides higher efficiency and
- extends battery life
- Low thermal impedance copper leadframe
- DFN2X5 6PP saves board space
- Fast switching speed
- High performance trench technology

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	VDS	20	V
Gate-Source Voltage	VGS	±12	V
Continuous Drain Current @ TC=25°C	ID	11.0	A
Continuous Drain Current @ TC=70°C	ID	8.5	A
Pulsed Drain Current	IDM	±40	A
Continuous Source Current (Diode Conduction)	IS	3.1	A
Power Dissipation (TC=25°C)	PD	3.5	W
Power Dissipation (TC=100°C)		1.8	W
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

Notes

a. Surface Mounted on 1” x 1” FR4 Board.

b. Pulse width limited by maximum junction temperature

Thermal characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Maximum Junction-to-Ambient(RthJA)	t <= 10 sec	62.5	°C/W
	Steady State	80	

Characteristics (Tc=25°C, unless otherwise specified)

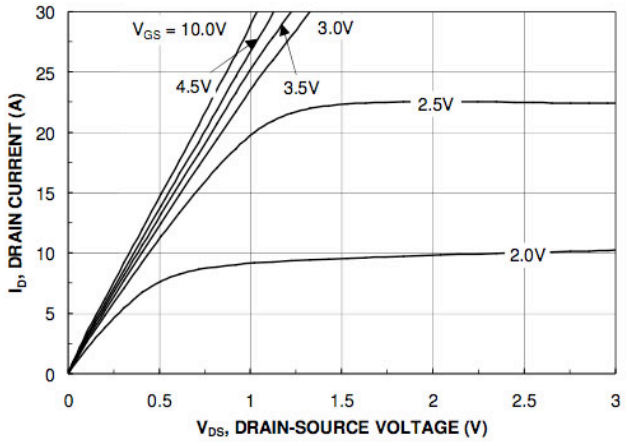
Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics					
VGS	VGS = VDS, ID = 250 uA	0.5	-	-	V
IGSS	VDS = 0 V, VGS = ± 12 V	-	-	±10	uA
IDSS	VDS = 16 V, VGS = 0 V	-	-	1.00	uA
	VDS = 16 V, VGS = 0 V, T J = 55oC	-	-	30	uA
ID(on)	VDS = 5 V, VGS = 4.5 V	20	-	-	A
rDS(on)	VGS = 4.5 V, ID = 6.7 A	-	-	22	mΩ
	VGS = 2.5 V, ID = 4.5 A	-	-	28	mΩ
gfs	VDS = 15 V, ID = 6 A	-	22	-	S
VSD	IS = 0.5 A, VGS = 0 V	-	0.7	-	V
Dynamic Characteristics					
Qg	VDS=15V, VGS=4.5V, ID=6A	-	9.2	-	nC
Qgs		-	1.9	-	nC
Qgd		-	2.8	-	nC
td(on)	VDD = 10 V, RL = 15 Ω , ID = 1 A, VGEN = 4.5 V	-	1.7	-	nS
tr		-	2.3	-	nS
td(off)		-	1.1	-	nS
tf		-	4.4	-	nS

Notes

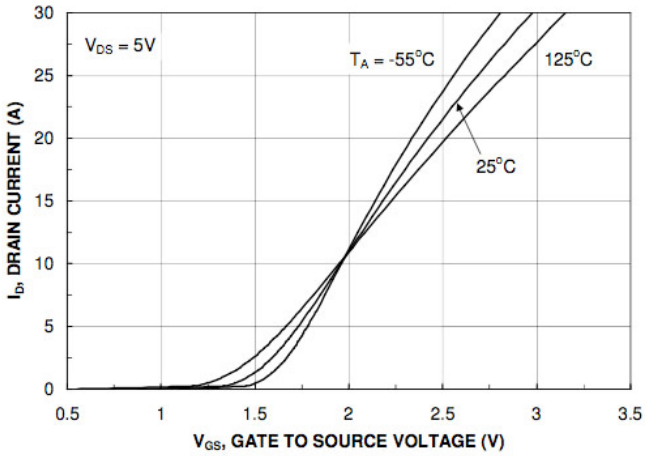
a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

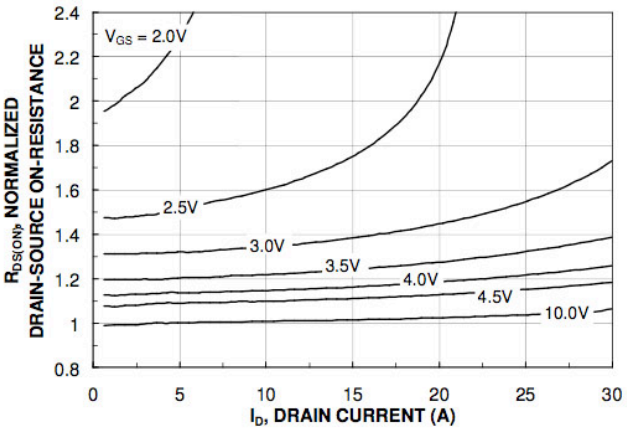
- **Characteristic Curves**



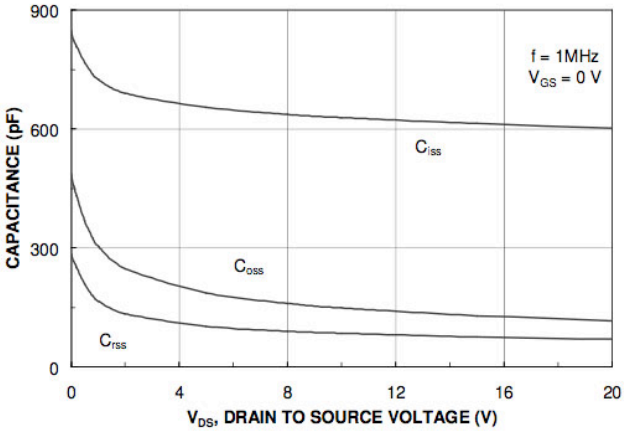
Output Characteristics



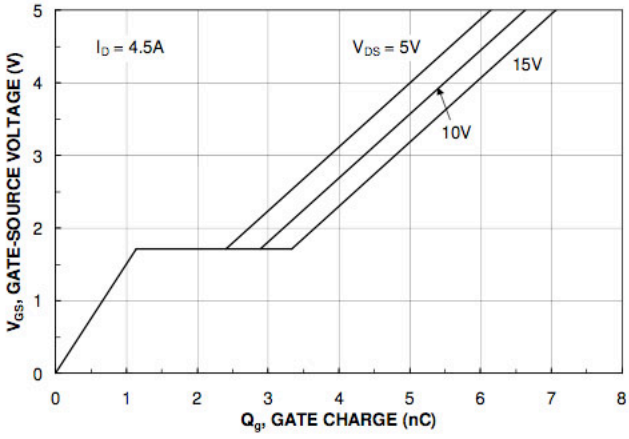
Transfer Characteristics



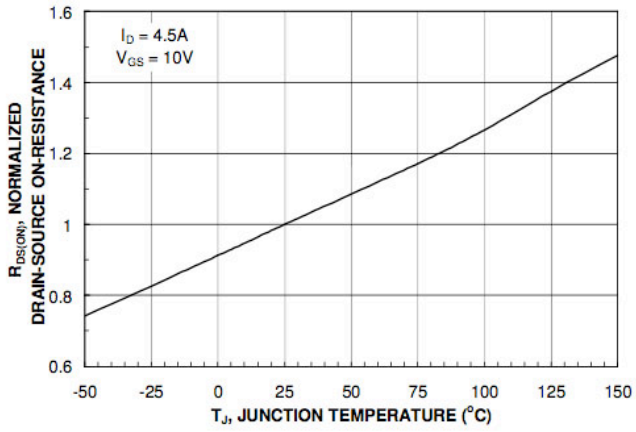
On-Resistance vs. Drain Current



Capacitance

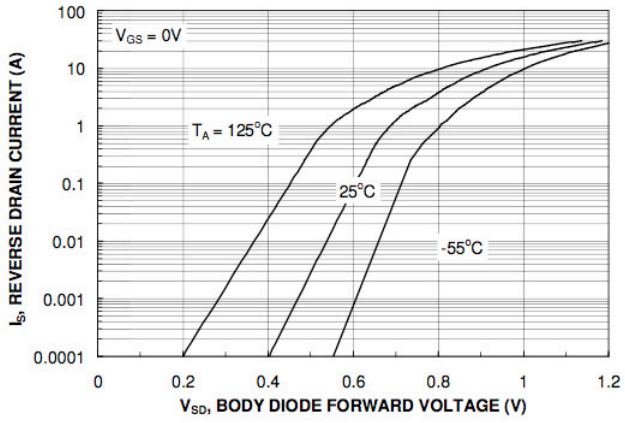


Gate Charge

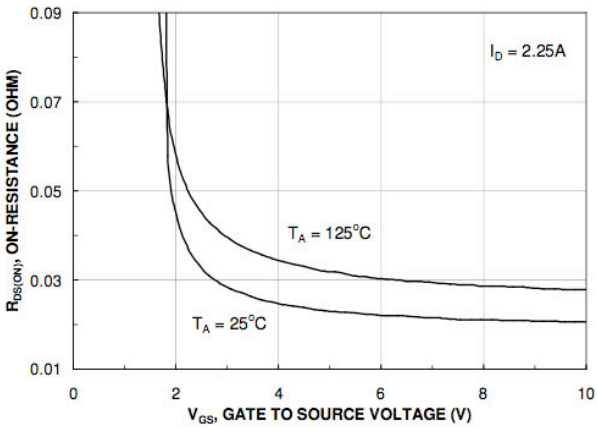


On-Resistance vs. Junction Temperature

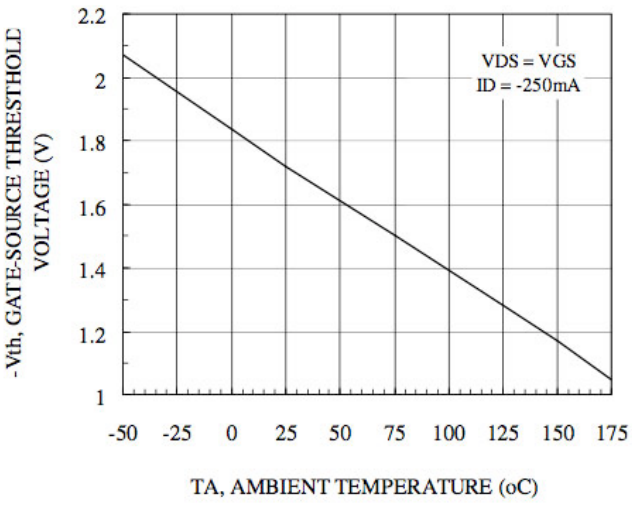
- **Characteristic Curves**



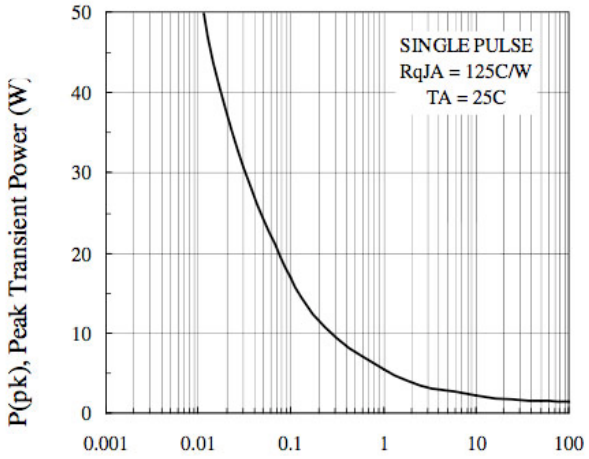
Source-Drain Diode Forward Voltage



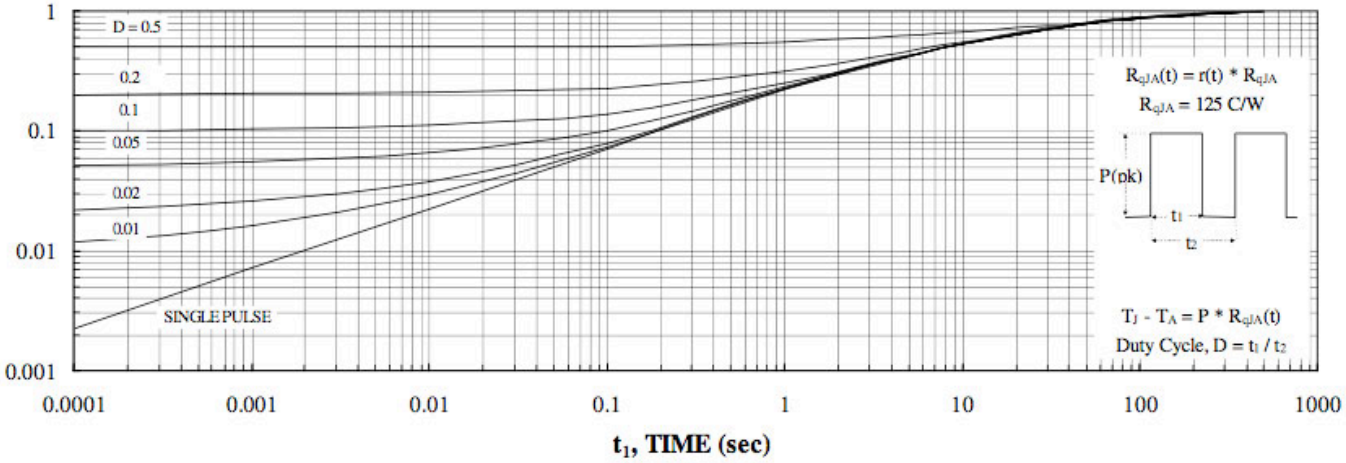
On-Resistance vs. Gate-to-Source Voltage



Vth Gate to Source Voltage Vs Temperature



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Junction to Ambient

- **Package Dimensions**

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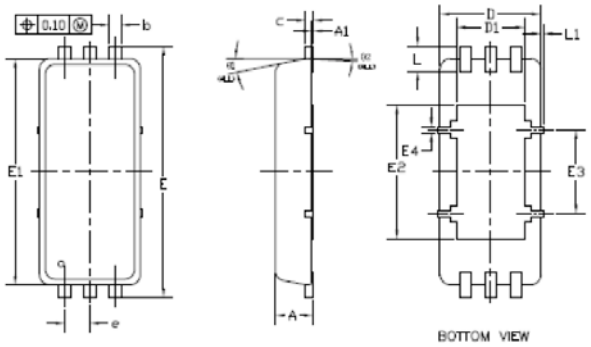

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	—	0.05	0.000	—	0.002
b	0.20	0.25	0.30	0.008	0.009	0.012
c	0.10	0.15	0.20	0.004	0.006	0.008
D		2.00 BSC			0.079 BSC	
D1	1.30	1.35	1.55	0.051	0.053	0.061
E		5.00 BSC			0.197 BSC	
E1		4.50 BSC			0.177 BSC	
E2	2.60	2.67	2.96	0.102	0.105	0.116
E3		1.67 BSC			0.066 BSC	
E4		0.13 BSC			0.005 BSC	
e		0.50 BSC			0.020 BSC	
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0	—	0.10	0	—	0.004
θ1	0°	10°	12°	0°	10°	12°
θ2		3° BSC			3° BSC	