

N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY						
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^e	Q _g (Typ.)			
	0.028 at V _{GS} = 4.5 V	6 ^a				
20	0.042 at V _{GS} = 2.5 V	6 ^a	8.8 nC			
	0.050 at V _{GS} = 1.8 V	5.6				



- Halogen-free According to IEC 61249-2-21
 Definition
- TrenchFET[®] Power MOSFET
- 100 % $\rm R_g$ Tested
- Compliant to RoHS Directive 2002/95/EC

APPLICATIONS

- DC/DC Converters
- Load Switch for Portable Applications

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage Gate-Source Voltage		V _{DS}	20	V
		V _{GS}	± 12	
	T _C = 25 °C		6 ^a	
Continuous Droin Current (T 150 °C)	T _C = 70 °C		5.1	
Continuous Drain Current ($T_J = 150 \ ^{\circ}C$)	T _A = 25 °C	I _D	5 ^{b, c}	
	T _A = 70 °C		4 ^{b, c}	A
Pulsed Drain Current		I _{DM}	20	
Outline Outline Duris Divide Outline	T _C = 25 °C		1.75	
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	1.04 ^{b, c}	
	T _C = 25 °C		2.1	
Maximum Davier Dissingtion	T _C = 70 °C		1.3	14/
Maximum Power Dissipation	T _A = 25 °C	P _D	1.25 ^{b, c}	W
	T _A = 70 °C		0.8 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	
Soldering Recommendations (Peak Tempera		260		

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	Typical	Maximum	Unit		
Maximum Junction-to-Ambient ^{b, d}	$t \le 5 s$	R _{thJA}	80	100	°C/W		
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	40	60	0/11		

Notes:

a. Package limited

b. Surface Mounted on 1" x 1" FR4 board.

c. t = 5 s.

d. Maximum under steady state conditions is 125 °C/W.

e. Based on T_C = 25 °C.

FREE

SOT-23 G 1 S 2 Top View

SPECIFICATIONS $T_J = 25 \text{ °C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V_{GS} = 0 V, I_D = 250 μ A	20			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I _D = 250 μA		25		- mV/°C	
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	1 <u>0</u> – 200 m (- 2.6			
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_D = 250 \ \mu A$	0.45		1.0	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 8 V$			± 100	nA	
	1	$V_{DS} = 20 V, V_{GS} = 0 V$			1	μΑ	
Zero Gate Voltage Drain Current	IDSS	V_{DS} = 20 V, V_{GS} = 0 V, T_{J} = 70 °C			10		
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \le 5$ V, V_{GS} = 4.5 V	20			Α	
		$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 5.0 \text{ A}$		0.028	28		
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 2.5 \text{ V}, \text{ I}_{D} = 4.7 \text{ A}$		0.042		Ω	
		V _{GS} = 1.8 V, I _D = 4.3 A		0.050			
Forward Transconductance ^a	9 _{fs}	V _{DS} = 10 V, I _D = 5.0 A		24		S	
Dynamic ^b					<u> </u>	I	
Input Capacitance	C _{iss}			865			
Output Capacitance	C _{oss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		105		pF	
Reverse Transfer Capacitance	C _{rss}			55			
		$V_{DS} = 10 \text{ V}, \text{ V}_{GS} = 5 \text{ V}, \text{ I}_{D} = 5.0 \text{ A}$		12	18		
Total Gate Charge	Qg			8.8	14	nC	
Gate-Source Charge	Q _{gs}	$V_{DS} = 10 \text{ V}, \text{ V}_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 5.0 \text{ A}$		1.1			
Gate-Drain Charge	Q _{gd}			0.7			
Gate Resistance	R _g	f = 1 MHz	0.5	2.4	4.8	Ω	
Turn-On Delay Time	t _{d(on)}			8	16		
Rise Time	t _r	V_{DD} = 10 V, R_L = 2.2 Ω		17	26		
Turn-Off Delay Time	t _{d(off)}	$\text{I}_\text{D} \cong$ 4 A, V_GEN = 4.5 V, R_g = 1 Ω		31	47		
Fall Time	t _f			8	16		
Turn-On Delay Time	t _{d(on)}			5	10	ns	
Rise Time	t _r	$V_{DD} = 10 \text{ V}, \text{ R}_{1} = 2.2 \Omega$		13	20		
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 4 \text{ A}, V_{\text{GEN}} = 5 \text{ V}, \text{R}_g = 1 \Omega$		21	32		
Fall Time	t _f	-		6	12		
Drain-Source Body Diode Characteristic			I	l °		I	
Continuous Source-Drain Diode Current	Is	T _C = 25 °C			1.75	Γ	
Pulse Diode Forward Current	I _{SM}	~			20	A	
Body Diode Voltage	V _{SD}	I _S = 4 A, V _{GS} = 0 V		0.75	1.2	v	
Body Diode Reverse Recovery Time	t _{rr}	6 / 46 -		12	20	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			5	10	nC	
Reverse Recovery Fall Time	t _a	$I_F = 4 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 ^\circ\text{C}$		7			
	y Rise Time t_b		<u> </u>	5	<u> </u>	ns	

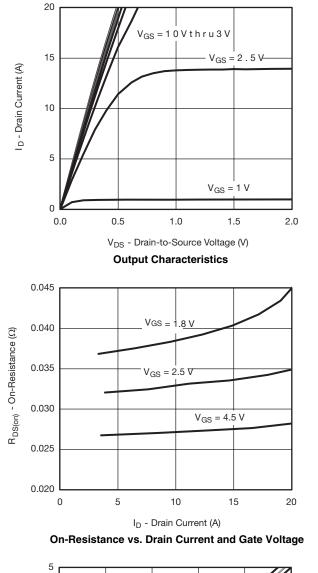
Notes:

a. Pulse test; pulse width \leq 300 $\mu s,$ duty cycle \leq 2 % b. Guaranteed by design, not subject to production testing.

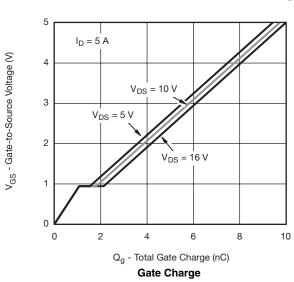
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

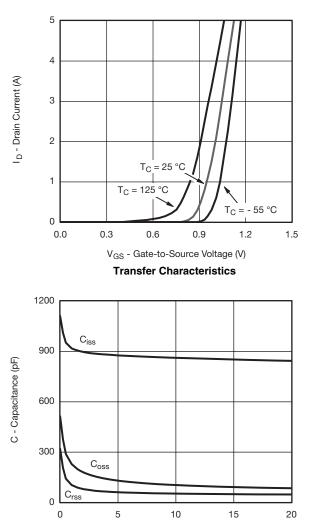
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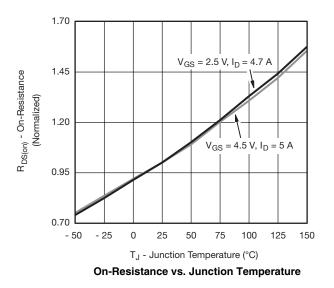


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

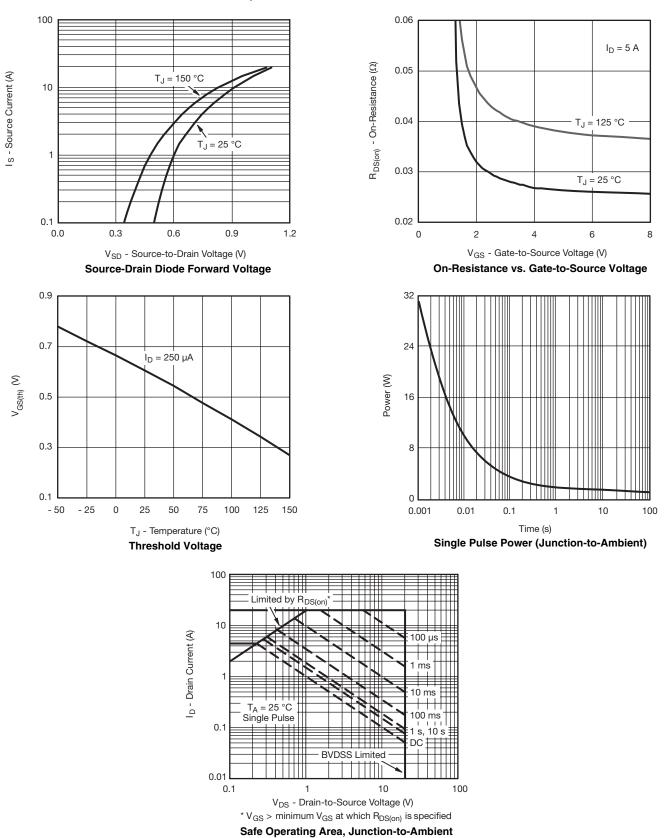




V_{DS} - Drain-to-Source Voltage (V) Capacitance



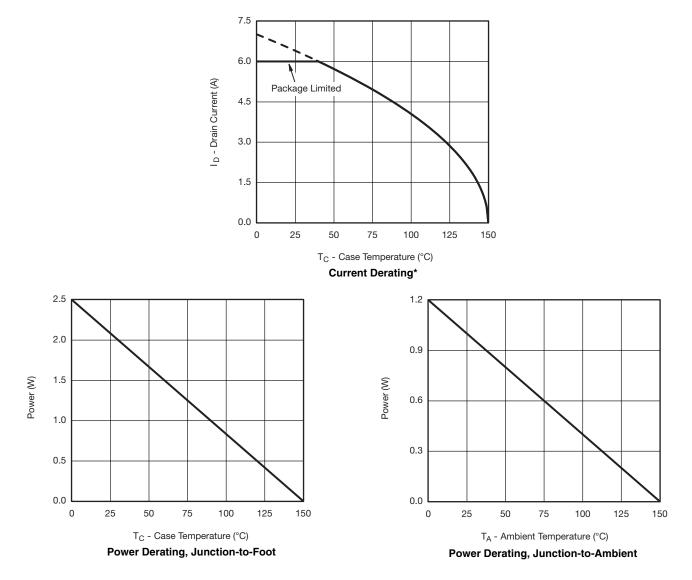




TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



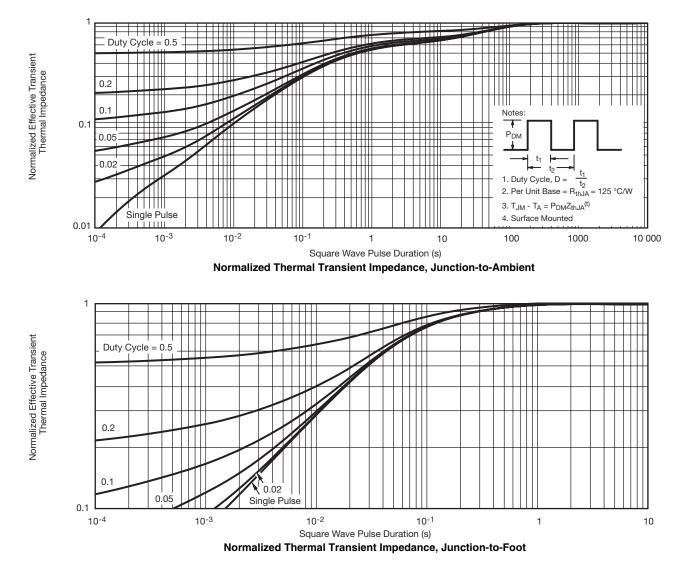
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



* The power dissipation P_D is based on $T_{J(max.)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

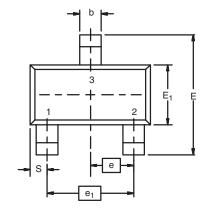


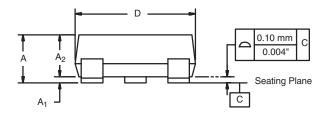


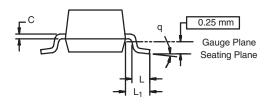




SOT-23 (TO-236): 3-LEAD



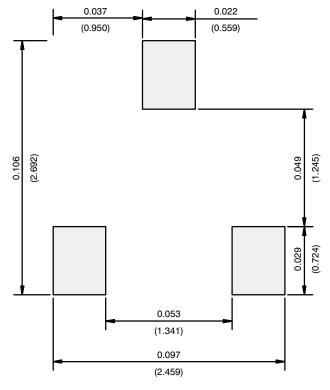




Dim	MILLIN	IETERS	INCHES		
	Min	Max	Min	Max	
Α	0.89	1.12	0.035	0.044	
A ₁	0.01	0.10	0.0004	0.004	
A ₂	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
C	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E ₁	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e ₁	1.90 BSC		0.0748 Ref		
L	0.40	0.60	0.016	0.024	
L ₁	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	
ECN: S-03946-Rev. K, 09- DWG: 5479	Jul-01		,		



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)



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