


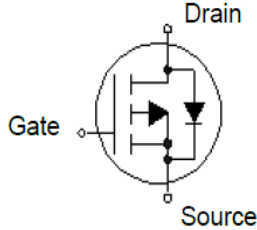
### P-Channel Enhancement-Mode MOSFET (-20V, -4.9A)

#### PRODUCT SUMMARY

$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m $\Omega$ ) Typ.
-20V	-4.9A	34 @ $V_{GS} = -4.5V, I_D = -4.5A$
		44 @ $V_{GS} = -2.5V, I_D = -2.5A$

#### Features

- Super high dense cell trench design for low  $R_{DS(on)}$
- Rugged and reliable
- SOT-23 package
- Lead (Pb) -free and halogen-free

	<p>EN2305 Pin Assignment &amp; Symbol 3-Lead Plastic SOT-23 Pin 1: Gate Pin 2: Source Pin3: Drain</p>	
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#### Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current (Continuous)	-4.9	A
$I_{DM}$	Drain Current (Pulsed) <sup>a</sup>	-15	A
$P_D$	Total Power Dissipation @ $T_A = 25^\circ\text{C}$	1.7	W
$I_S$	Maximum Diode Forward Current	-4.9	A
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$R_{QJA}$	Thermal Resistance Junction to Ambient (PCB mounted) <sup>b</sup>	75	$^\circ\text{C/W}$

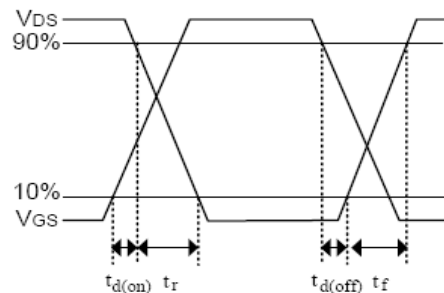
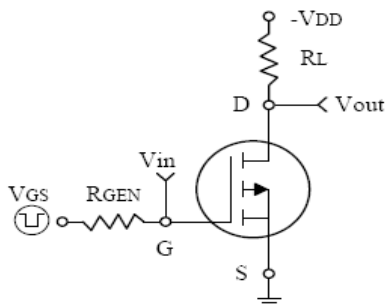
a: Repetitive Rating; Pulse width limited by the maximum junction temperature.

b: 1-in<sup>2</sup> 2oz Cu PCB board

### Electrical Characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
<b>• Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$	-	-	1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>• On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.45		-1	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-4.5V, I_D=-4.9A$	-	34	45	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$		44	60	
<b>• Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1\text{MHz}$	-	740	-	PF
$C_{oss}$	Output Capacitance		-	290	-	
$C_{rss}$	Reverse Transfer Capacitance		-	190	-	
<b>• Switching Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=-10V, I_D=-1A, V_{GS}=-4.5V$	-	7.8	-	nC
$Q_{gs}$	Gate-Source Charge		-	1.2	-	
$Q_{gd}$	Gate-Drain Charge		-	1.6	-	
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-4V, R_L=1.2\Omega, I_D=1A, V_{GEN}=-4.5V, R_G=1\Omega$	-	12	-	nS
$t_r$	Turn-on Rise Time		-	35	-	
$t_{d(off)}$	Turn-off Delay Time		-	30	-	
$t_f$	Turn-off Fall Time		-	10	-	
<b>• Drain-Source Diode Characteristics</b>						
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V

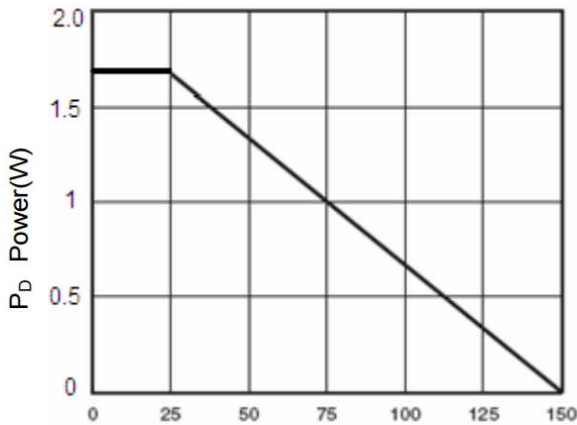
Note: Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$



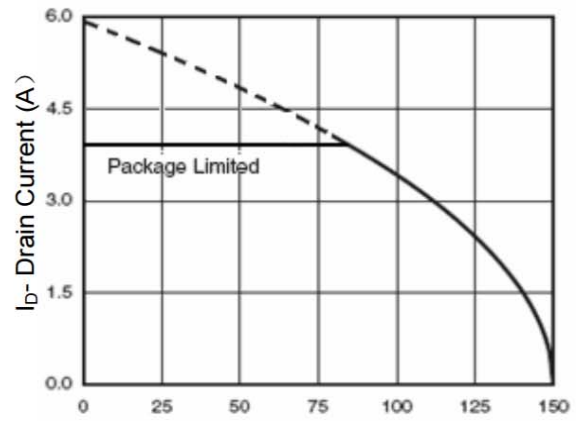
Switching Test Circuit and Switching Waveforms



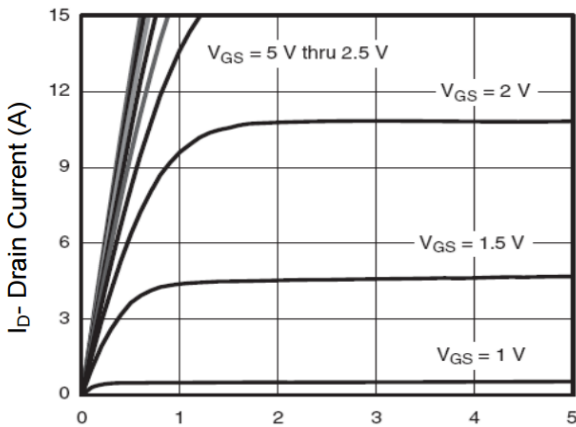
### Typical Characteristics Curves (Ta=25°C, unless otherwise note)



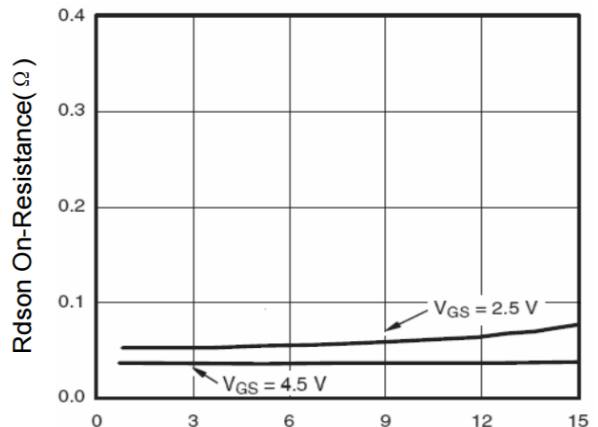
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 1 Power Dissipation**



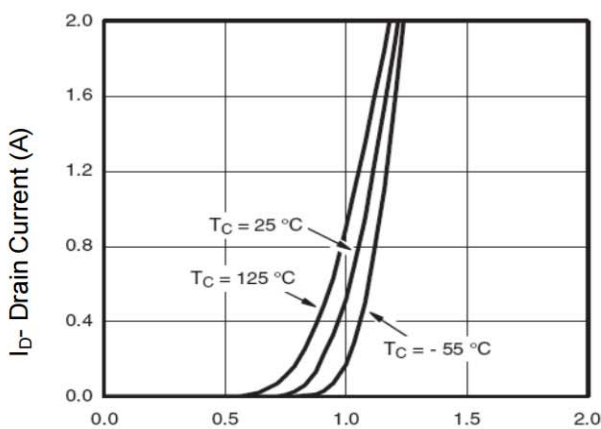
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 2 Drain Current**



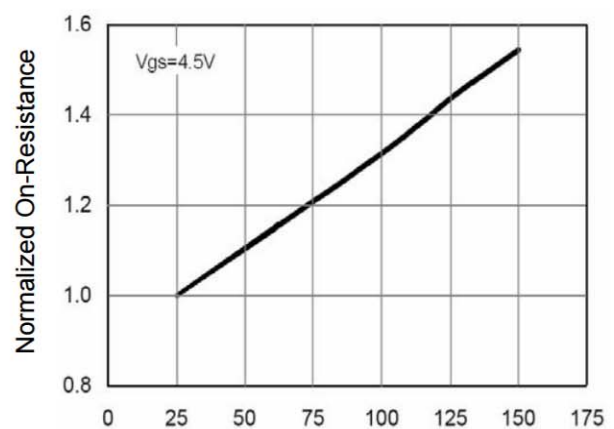
V<sub>ds</sub> Drain-Source Voltage (V)  
**Figure 3 Output Characteristics**



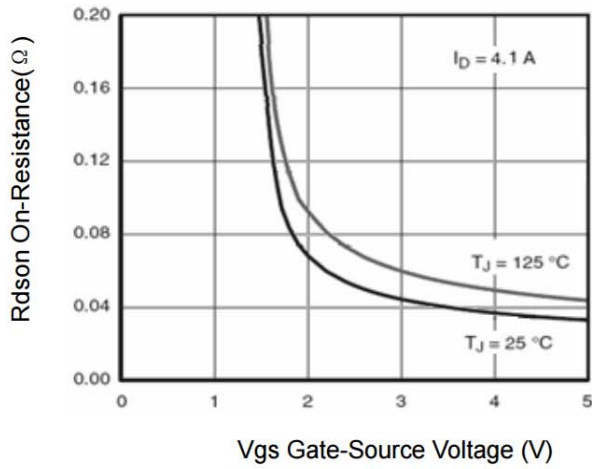
I<sub>D</sub>- Drain Current (A)  
**Figure 4 Drain-Source On-Resistance**



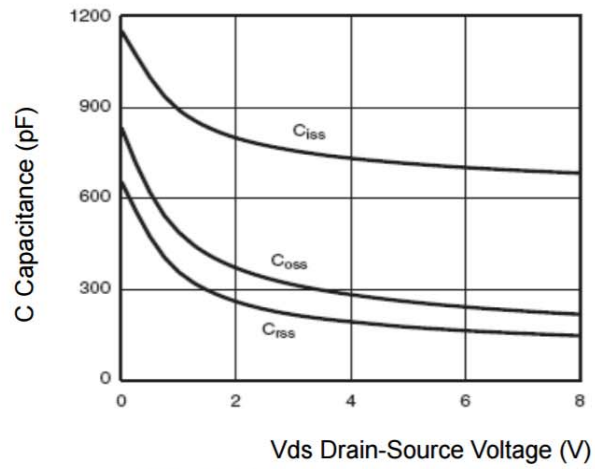
V<sub>gs</sub> Gate-Source Voltage (V)  
**Figure 5 Transfer Characteristics**



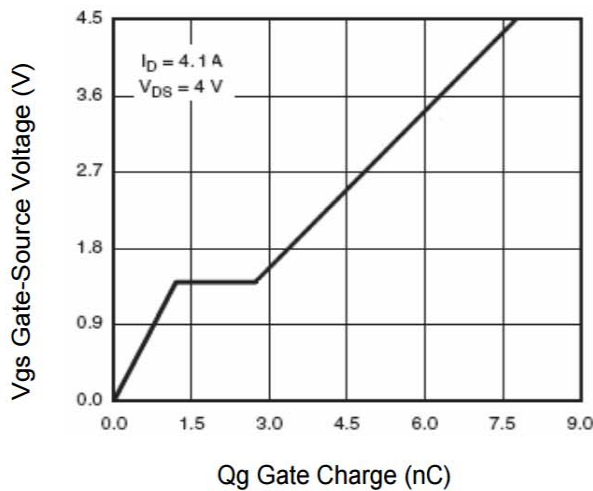
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 6 Drain-Source On-Resistance**



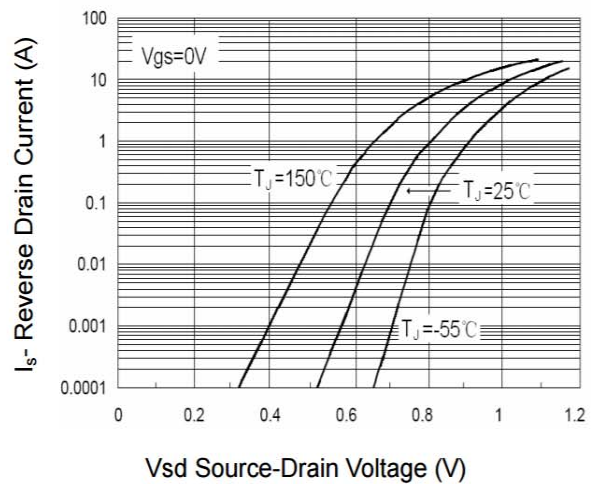
**Figure 7 Rdson vs Vgs**



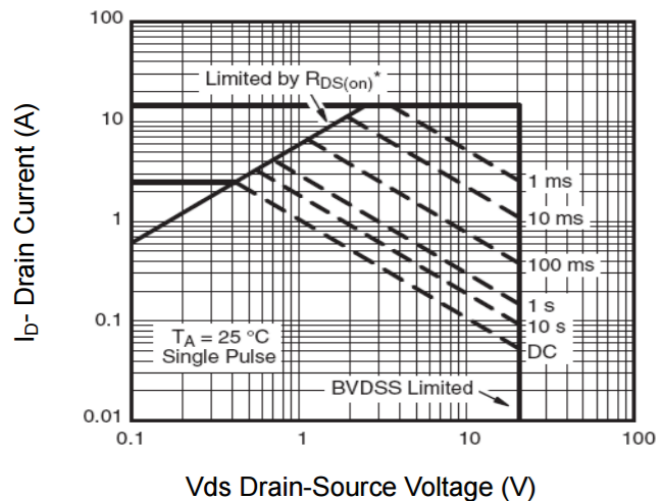
**Figure 8 Capacitance vs Vds**



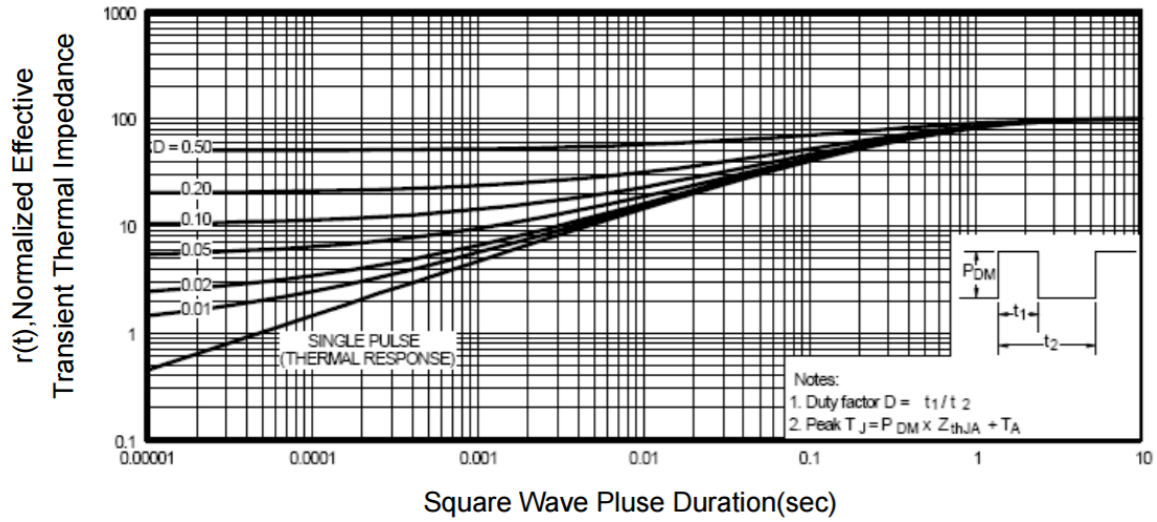
**Figure 9 Gate Charge**



**Figure 10 Source-Drain Diode Forward**

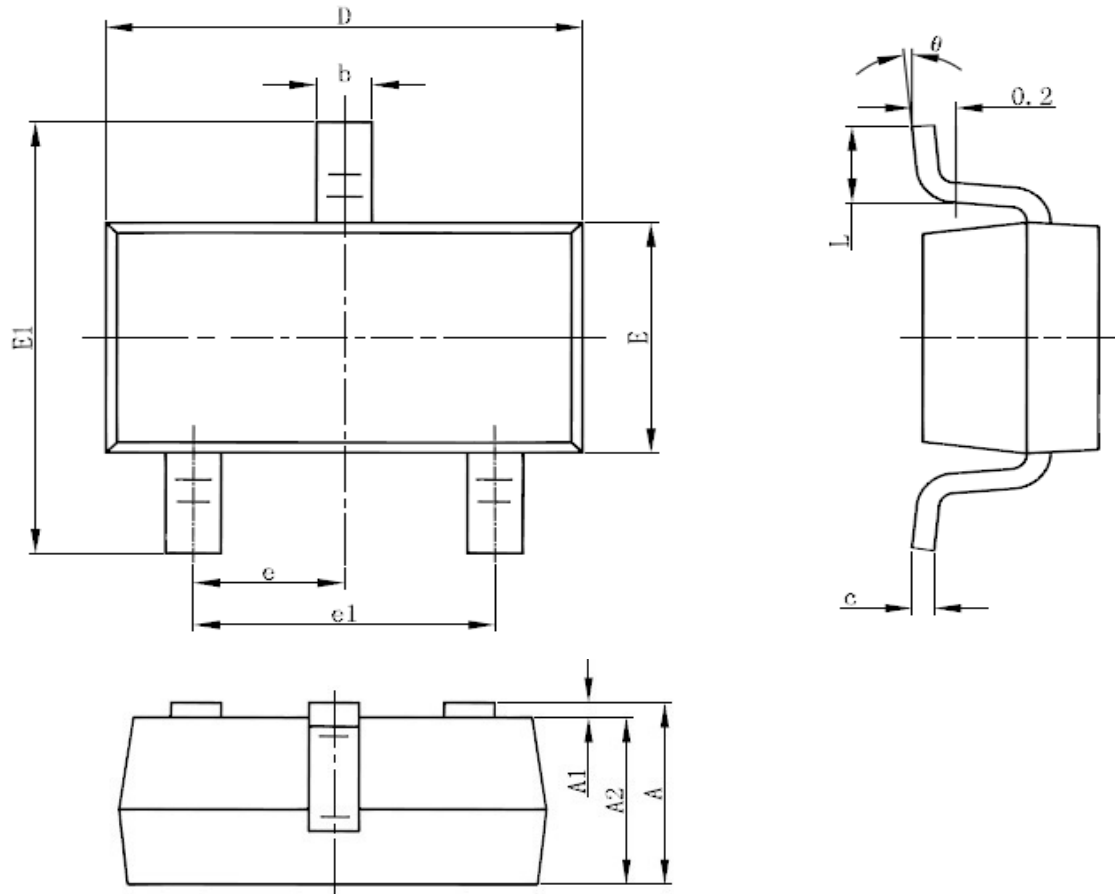


**Figure 11 Safe Operation Area**



**Figure 12 Normalized Maximum Transient Thermal Impedance**

### SOT-23 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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