

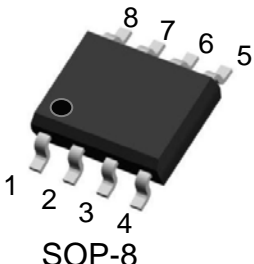
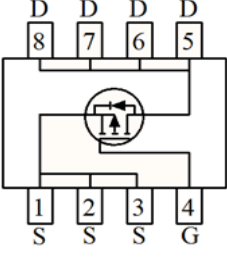
### P-Channel Enhancement-Mode MOSFET (-30V, -9.1A)

#### PRODUCT SUMMARY

$V_{DSS}$	$I_D$	$R_{DS(on)}$ (m $\Omega$ )TYP
-30	-9.1	16 @ $V_{GS} = -10V, I_D = -9.1A$
		21 @ $V_{GS} = -4.5V, I_D = -6.9A$

#### Features

- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Surface mount Package
- Ordering information : ET4435 (Lead (Pb) -free and halogen-free)

 <p>SOP-8</p>		<p>Pin1,2,3: Source Pin4: Gate Pin5,6,7,8: Drain</p>	TOP Marking
			<p>ET4435 part number xxxxxx ID CODE</p>

#### Absolute Maximum Ratings ( $T_A = 25^\circ C$ , unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current (Continuous)	$T_C = 25^\circ C$	-9.1
		$T_C = 70^\circ C$	-7.2
$I_{DM}$	Drain Current (Pulsed) <sup>a</sup>	-50	A
$P_D$	Total Power Dissipation @ $T_A = 25^\circ C$	3.1	W
$I_S$	Maximum Diode Forward Current	-20	A
$T_j, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$
$R_{QJA}$	Thermal Resistance Junction to Ambient (PCB mounted) <sup>b</sup>	40	$^\circ C/W$

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	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>• On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.5	-3	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-4.5V, I_D=-6.9A$	-	21	35	m $\Omega$
		$V_{GS}=-10V, I_D=-9.1A$	-	16	20	
<b>• Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	-	1600	-	PF
$C_{oss}$	Output Capacitance		-	350	-	
$C_{rss}$	Reverse Transfer Capacitance		-	300	-	
<b>• Switching Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=-15V, I_D=-4.6A, V_{GS}=-5V$	-	30	-	nC
$Q_{gs}$	Gate-Source Charge		-	5.5	-	
$Q_{gd}$	Gate-Drain Charge		-	8	-	
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-15V, R_L=5W, I_D=-1A, V_{GEN}=-10V, R_G=6W$	-	10	-	nS
$t_r$	Turn-on Rise Time		-	15	-	
$t_{d(off)}$	Turn-off Delay Time		-	110	-	
$t_f$	Turn-off Fall Time		-	70	-	
<b>• Drain-Source Diode Characteristics</b>						
$V_{SD}$	Drain-Source Diode Forward	$V_{GS}=0V, I_S=-9.1A$	-	-	-1.2	V

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

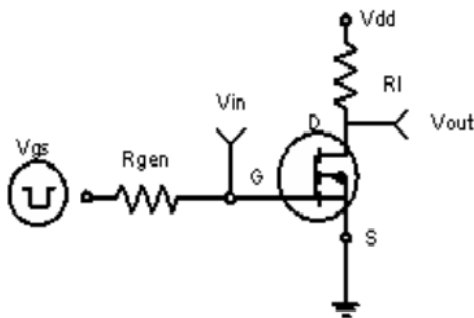


Figure 1: Switching Test Circuit

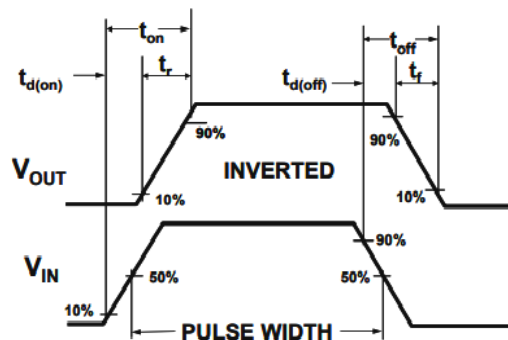
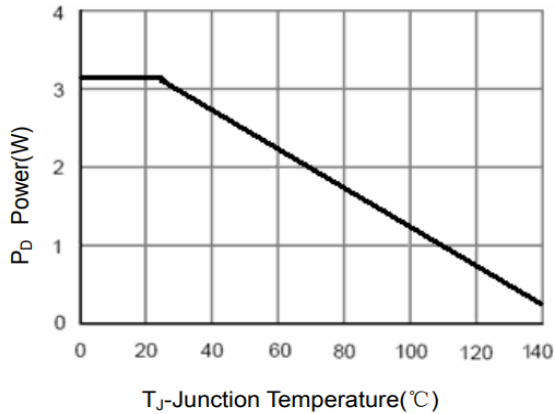
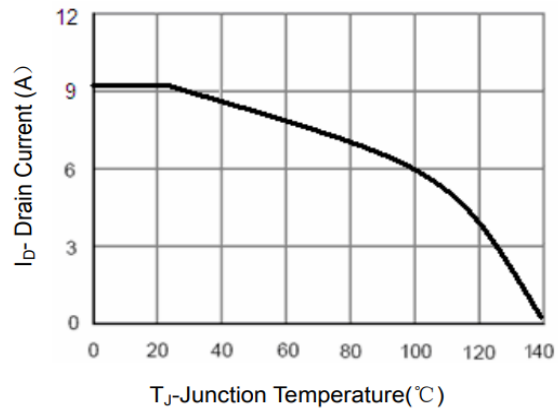


Figure 2: Switching Waveforms

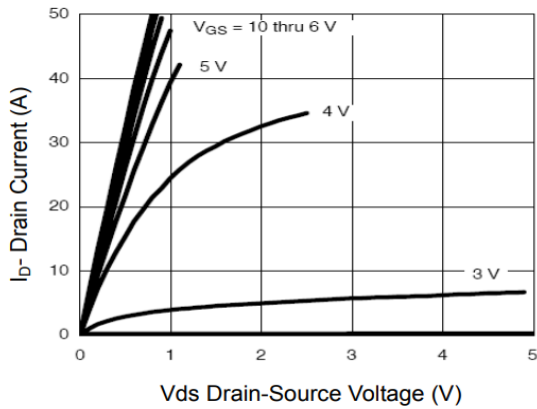
### Typical Characteristics Curves (Ta=25°C, unless otherwise note)



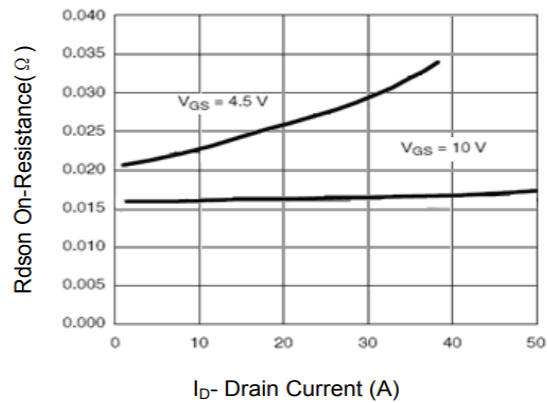
**Figure 3 Power Dissipation**



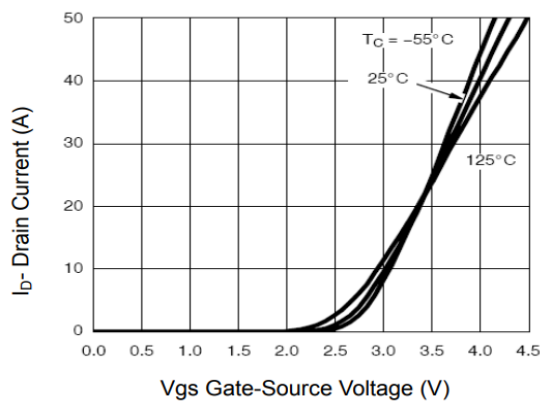
**Figure 4 Drain Current**



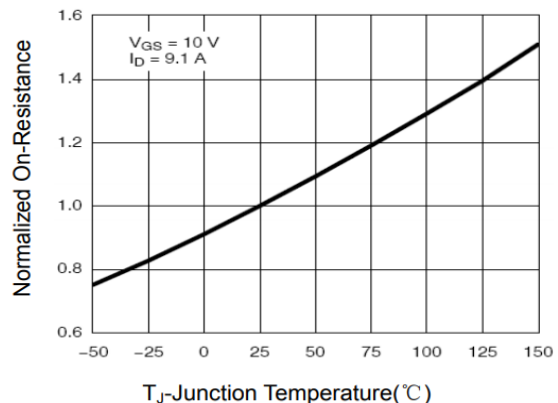
**Figure 5 Output Characteristics**



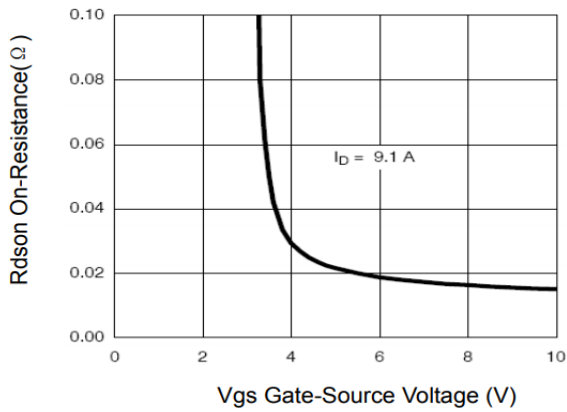
**Figure 6 Drain-Source On-Resistance**



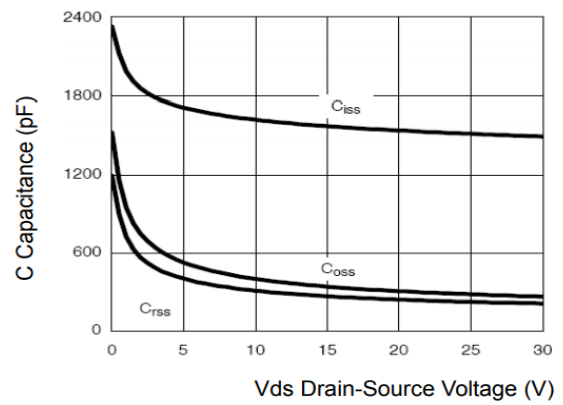
**Figure 7 Transfer Characteristics**



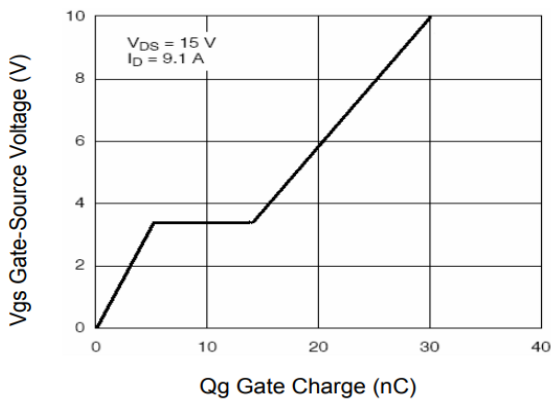
**Figure 8 Drain-Source On-Resistance**



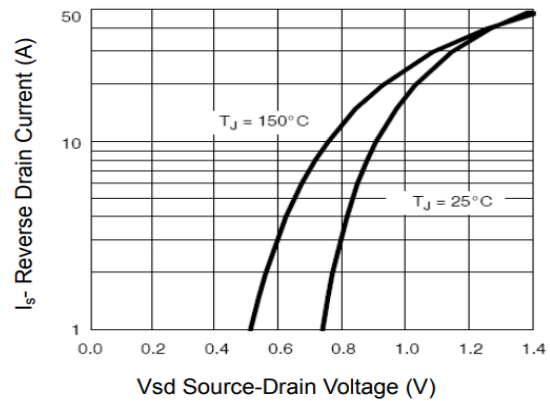
**Figure 9 Rdson vs Vgs**



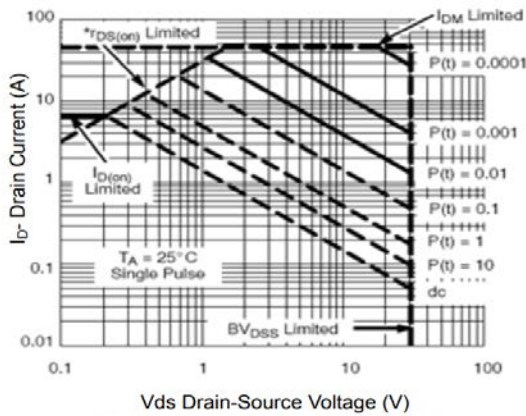
**Figure 10 Capacitance vs Vds**



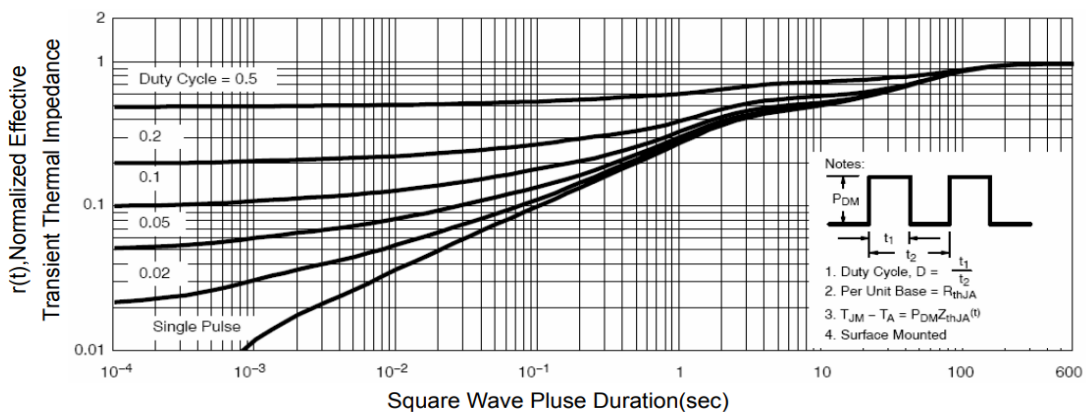
**Figure 11 Gate Charge**



**Figure 12 Source-Drain Diode Forward**

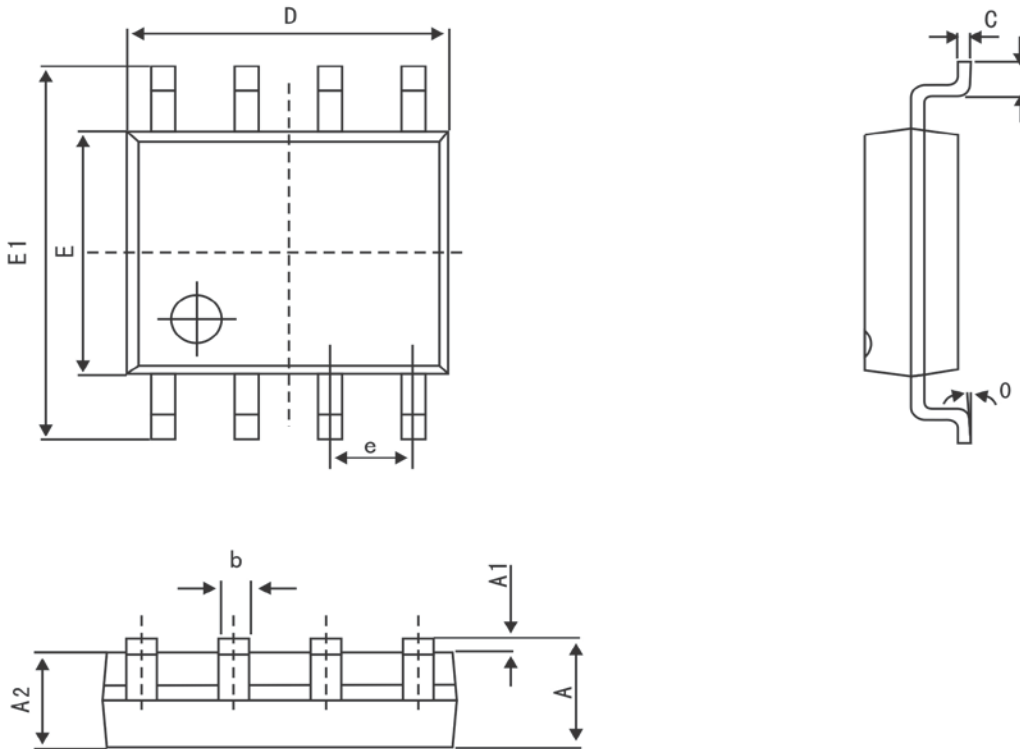


**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

### SOP-8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters (MM)		Dimensions In Inches (MIL)	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°

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