

SE60P03

**P-Channel Enhancement-Mode MOSFET**

Revision: A

**General Description**

Advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and low operation voltage. This device is suitable for using as a load switch or in PWM applications.

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

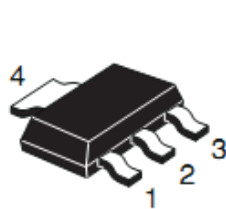
**Features**

For a single MOSFET

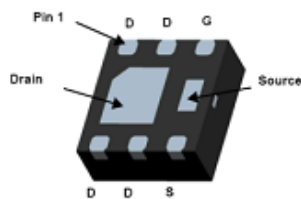
- $V_{DS} = -60V$
- $R_{DS(ON)} = 110m\Omega @ V_{GS}=-10V$

**Pin configurations**

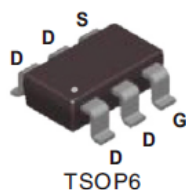
See Diagram below



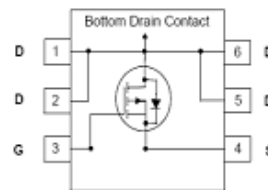
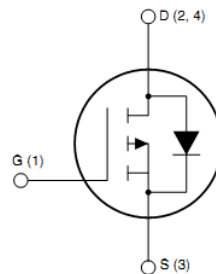
**SOT-223**



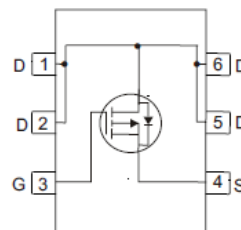
**DFN2x2-6L Pin Assignment**



**TSOP6**



**Schematic diagram**



**Top View**

**Absolute Maximum Ratings**

Parameter		Symbol	Rating	Units
Drain-Source Voltage		$V_{DS}$	-60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	-4	A
	Pulsed		-12	
Total Power Dissipation	@ $T_A=25^\circ C$	$P_D$	2.6	W
Operating Junction Temperature Range		$T_J$	-55 to 150	$^\circ C$

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Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS (Note 2)</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0 V	-60			V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = -60V, V <sub>GS</sub> =0V			-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = 20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA	-2		-4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-4A	-	110	160	mΩ
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-48V, f=1MHz		340		pF
C <sub>oss</sub>	Output Capacitance			40		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			20		pF
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge <sup>2</sup>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-48V, I <sub>D</sub> =-3A		6.4		nC
Q <sub>gs</sub>	Gate Source Charge			1.7		nC
Q <sub>gd</sub>	Gate Drain Charge			1.7		nC
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-48V, R <sub>GEN</sub> =4.7Ω		6.4		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			14		ns
t <sub>d(r)</sub>	Turn-On Rise Time			5.3		ns
t <sub>d(f)</sub>	Turn-Off Fall Time			3.7		ns
<b>Thermal Resistance</b>						
Symbol	Parameter		Typ	Max		Units
R <sub>θJA</sub>	Junction to Ambient (t ≤ 10s)		-	57		°C/W

Typical Characteristics

Figure 2. Safe operating area

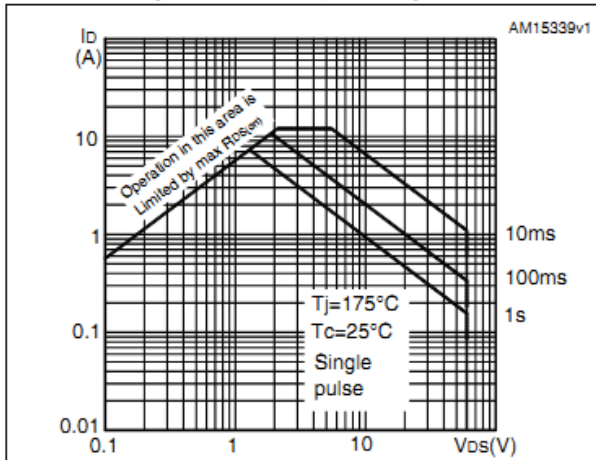


Figure 3. Thermal impedance

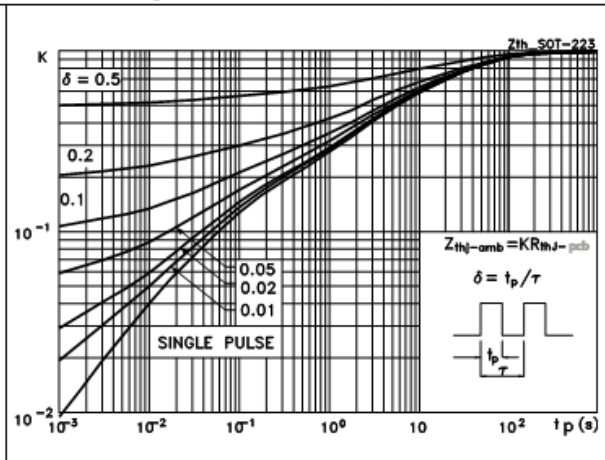


Figure 4. Output characteristics

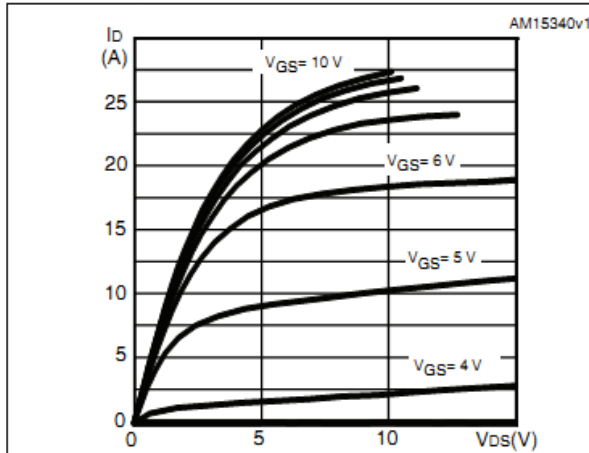


Figure 5. Transfer characteristics

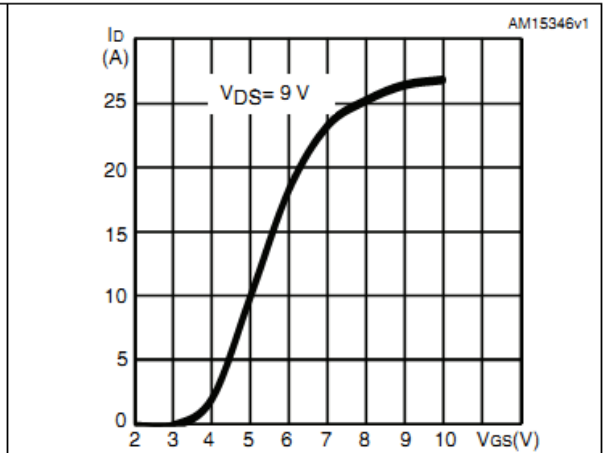


Figure 6. Gate charge vs gate-source voltage

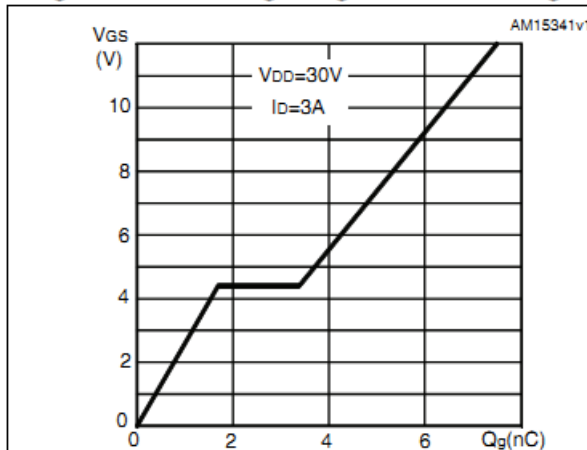
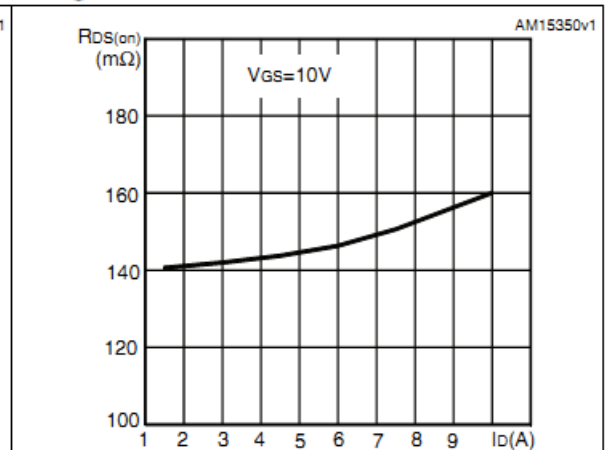


Figure 7. Static drain-source on-resistance



Typical Characteristics

Figure 8. Capacitance variations

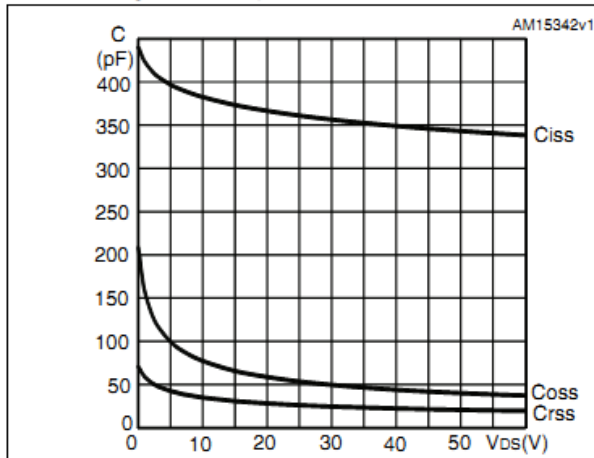


Figure 9. Normalized  $B_{VDSS}$  vs temperature

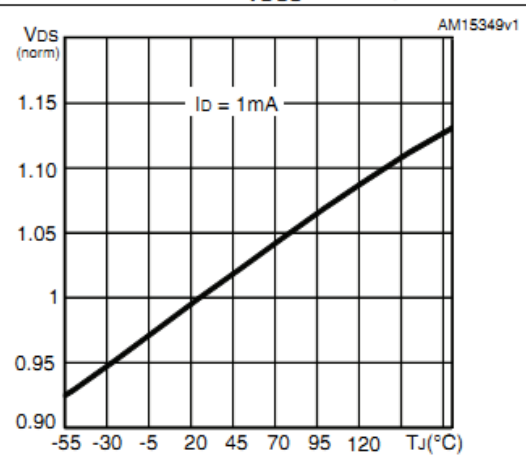


Figure 10. Normalized gate threshold voltage vs temperature

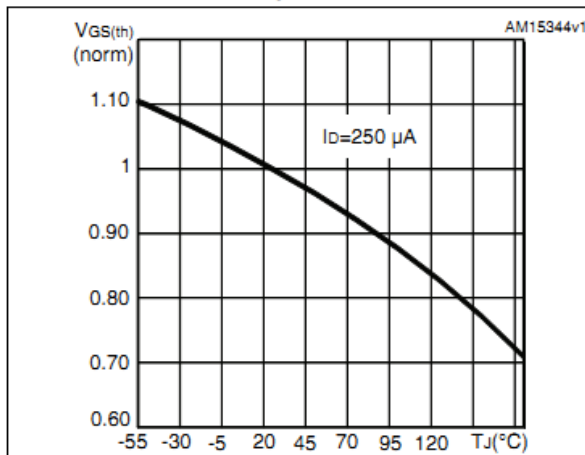


Figure 11. Normalized on-resistance vs temperature

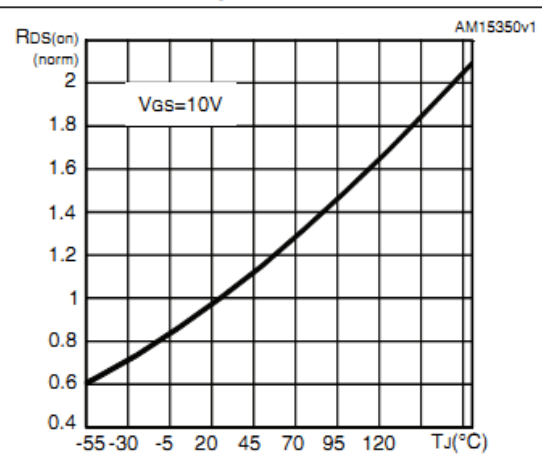
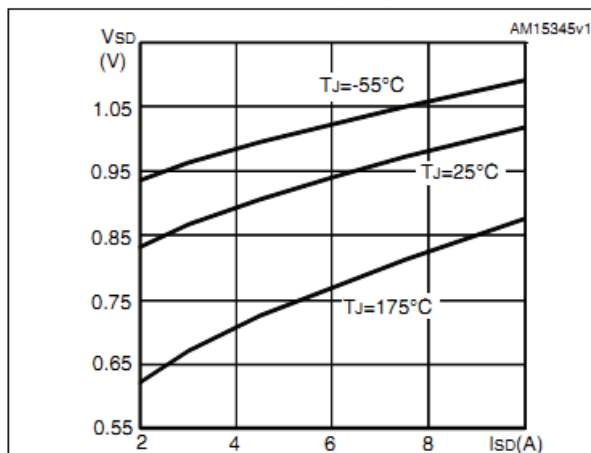


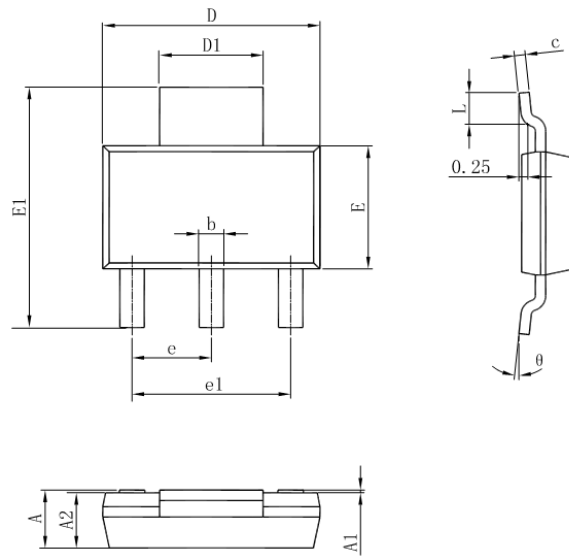
Figure 12. Source-drain diode forward characteristics



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## Package Outline Dimension

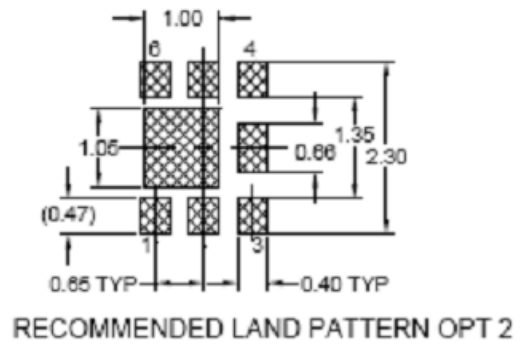
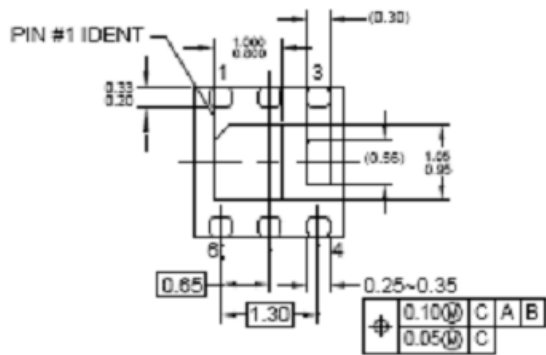
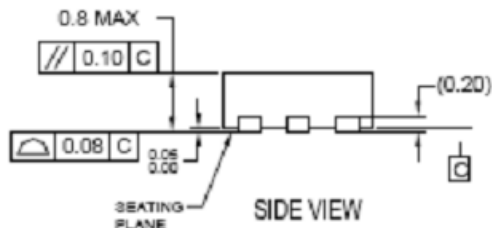
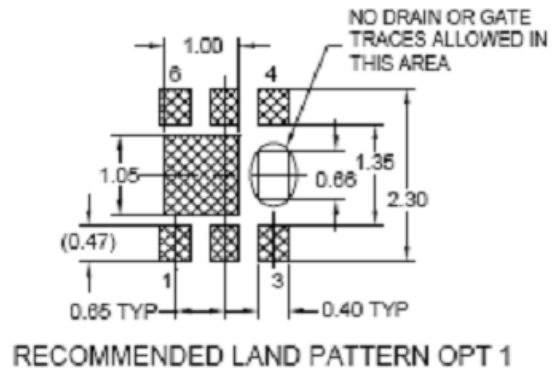
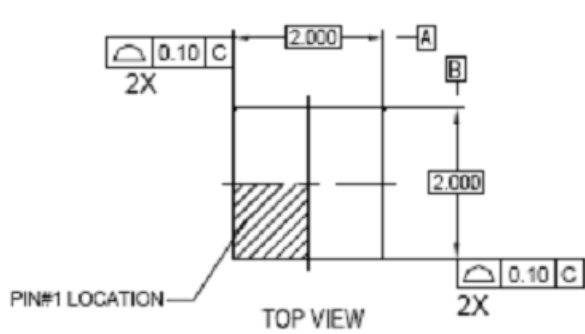
### SOT-223



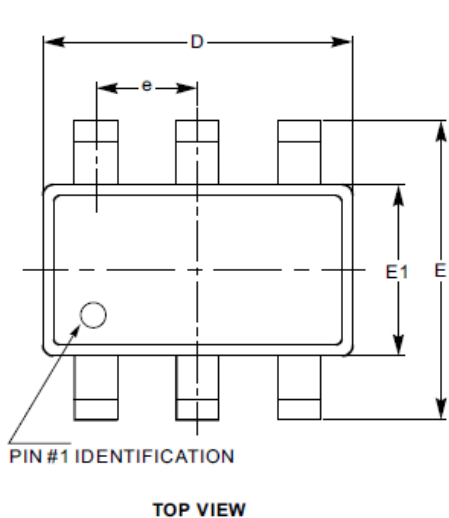
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
$\theta$	0°	10°	0°	10°

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DFN2 x 2-6L

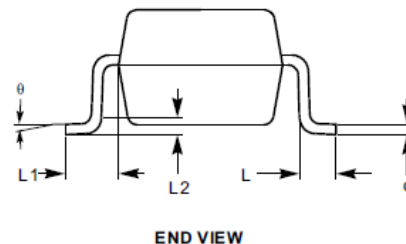
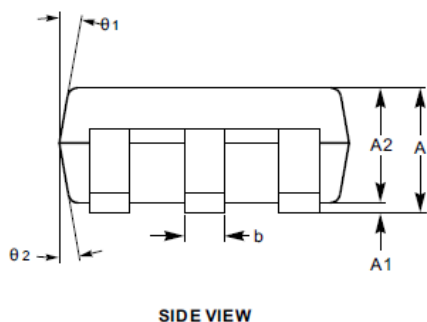


TSOP-6



Unit:mm

SYMBOL	MIN	NOM	MAX
A	0.90		1.25
A1	0.00		0.15
A2	0.70	1.10	1.20
b	0.30	0.40	0.50
c	0.08	0.13	0.20
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
L	0.30	0.45	0.60
L1	0.60 REF		
L2	0.25 REF		
$\theta$	0°	4°	8°
$\theta 1$	5°	10°	15°
$\theta 2$	5°	15°	15°



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