

SE4060, SE6080S, SE8090S

**N-Channel Enhancement-Mode MOSFET**

Revision: A

**General Description**

Thigh Density Cell Design For Ultra Low On-Resistance Fully Characterized Avalanche Voltage and Current Improved Shoot-Through FOM

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

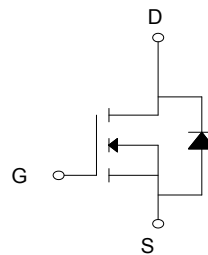
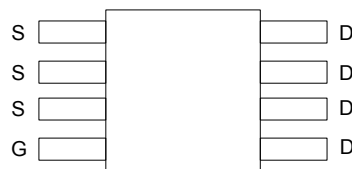
**Features**

For a single MOSFET

- $V_{DS} = 40V$
- $R_{DS(ON)} = 7m\Omega @ V_{GS}=10V$

**Pin configurations**

See Diagram below



**Absolute Maximum Ratings**

Parameter	Symbol	Rating			Units	
		4060	6080S	8090S		
Drain-Source Voltage	$V_{DS}$	40	60	80	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	V	
Drain Current	Continuous	60	80	80	A	
	Pulsed	200	220	320		
Total Power Dissipation	@TA=25°C	$P_D$	65	110	125	W
Operating Junction Temperature Range	$T_J$	-55 to 175			°C	

**SE4060,SE6080S,SE8090S**

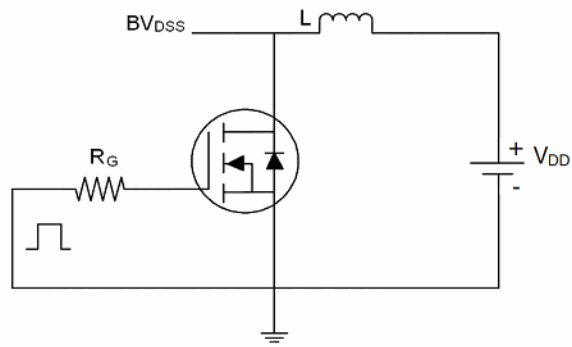
<b>Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)</b>						
<b>Symbol</b>	<b>Parameter</b>	<b>Test Conditions</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
<b>OFF CHARACTERISTICS</b>						
<b>SE4060</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0 V	40	45		V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = 40V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =20 V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.6	2.5	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	7	13	mΩ
<b>SE6080S</b>						
B <sub>V</sub> DSS	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> = 48V, 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> =40A		7	8.5	mΩ
<b>SE8090S</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0 V	80			V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = 80V, 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	3	4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =40A	-	9	11	mΩ
<b>DYNAMIC PARAMETERS</b>						
<b>SE4060</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz		1800		pF
C <sub>oss</sub>	Output Capacitance			280		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			190		pF
<b>SE6080S</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =40V, f=1MHz		7765		pF
C <sub>oss</sub>	Output Capacitance			960		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			66		pF
<b>SE8090S</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =40V, f=1MHz		4120		pF
C <sub>oss</sub>	Output Capacitance			520		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			200		pF

Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>SWITCHING PARAMETERS</b>						
<b>SE4060</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =20V, R <sub>L</sub> =1Ω R <sub>G</sub> =3Ω		6.4		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			29.6		ns
t <sub>d(r)</sub>	Turn-On Rise Time			17.2		ns
t <sub>d(f)</sub>	Turn-Off Fall Time			16.8		ns
<b>SE6080S</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =40V, R <sub>GEN</sub> =3Ω		24		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			55		ns
t <sub>d(r)</sub>	Turn-On Rise Time			18		ns
t <sub>d(f)</sub>	Turn-Off Fall Time			17		ns
<b>SE8090S</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =40V, R <sub>GEN</sub> =4.7Ω I <sub>D</sub> =2A		34		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			103		ns
t <sub>d(r)</sub>	Turn-On Rise Time			95		ns
t <sub>d(f)</sub>	Turn-Off Fall Time			33		ns
<b>Thermal Resistance</b>						
Symbol	Parameter		Typ	Max		Units
R <sub>θJA</sub>	Junction to Ambient (each bin with recommended lands)		-	2.3		°C/W

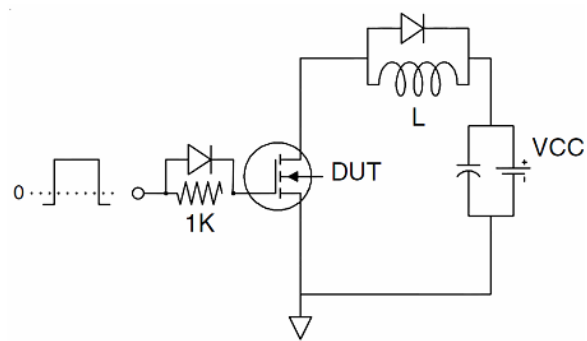
# SE4060,SE6080S,SE8090S

## Test Circuit

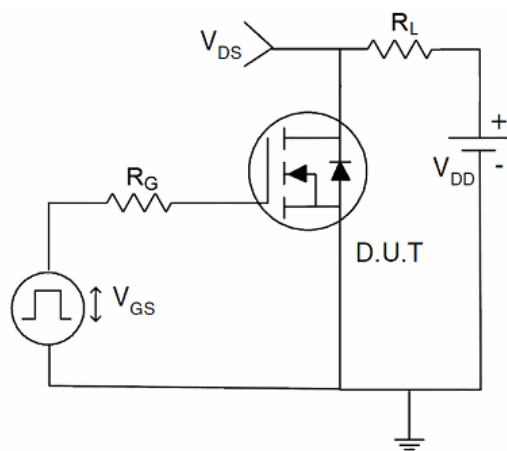
### 1) $E_{AS}$ Test Circuit



### 2) Gate Charge Test Circuit



### 3) Switch Time Test Circuit



Typical Characteristics-SE4060

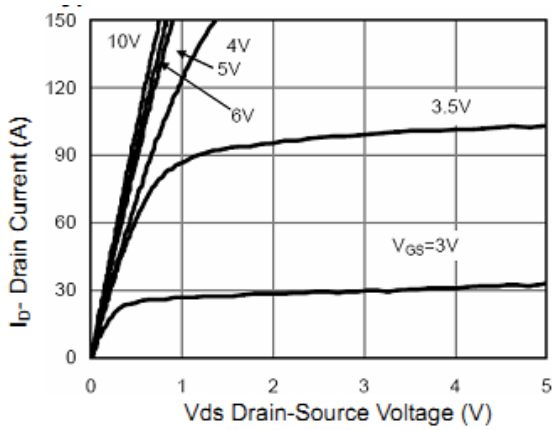


Figure 1 Output Characteristics

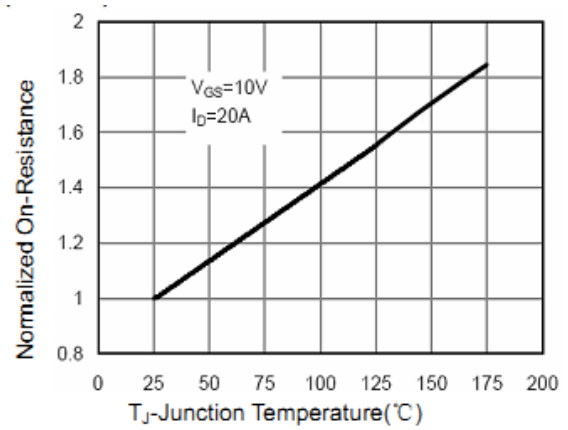


Figure 4 Rdson-Junction Temperature

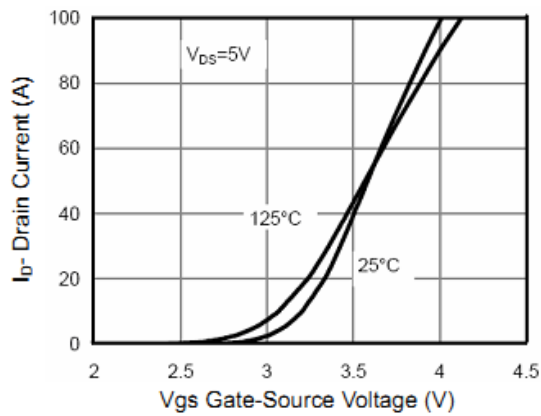


Figure 2 Transfer Characteristics

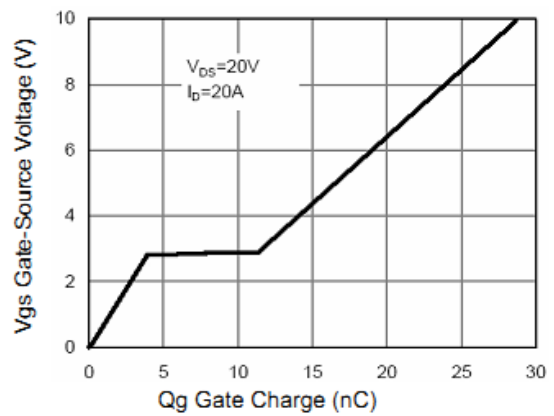


Figure 5 Gate Charge

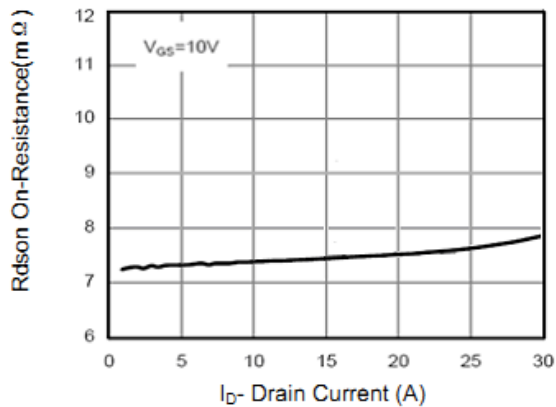


Figure 3 Rdson- Drain Current

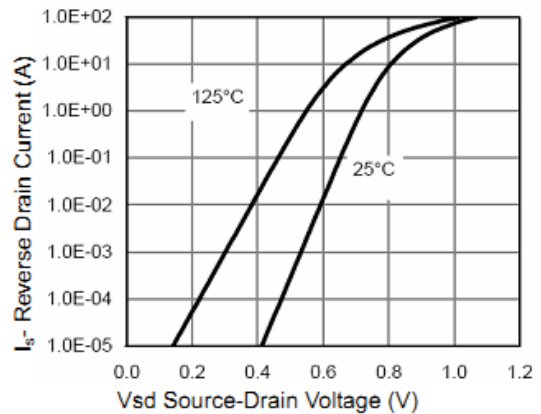


Figure 6 Source- Drain Diode Forward

Typical Characteristics-SE4060

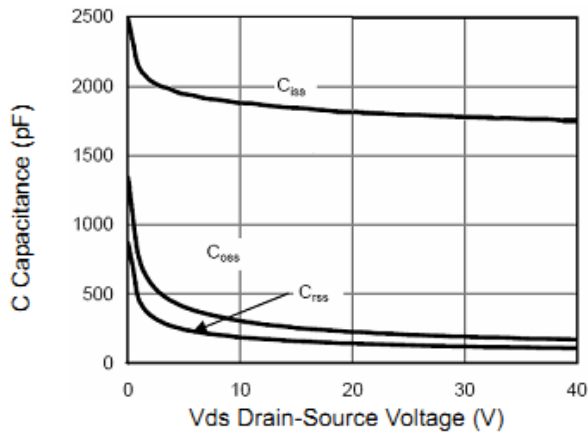


Figure 7 Capacitance vs Vds

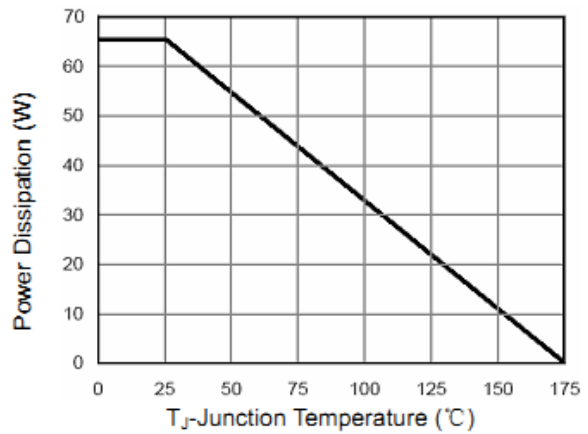


Figure 9 Power De-rating

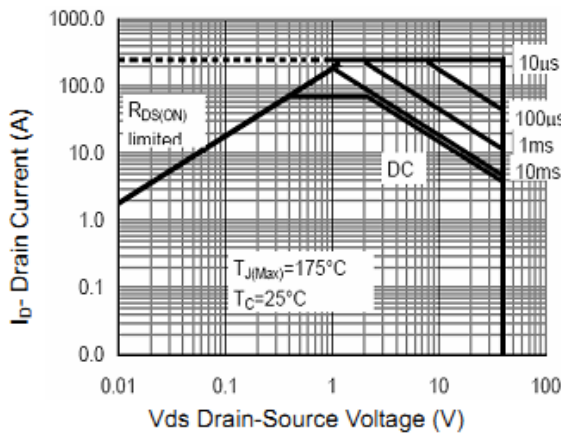


Figure 8 Safe Operation Area

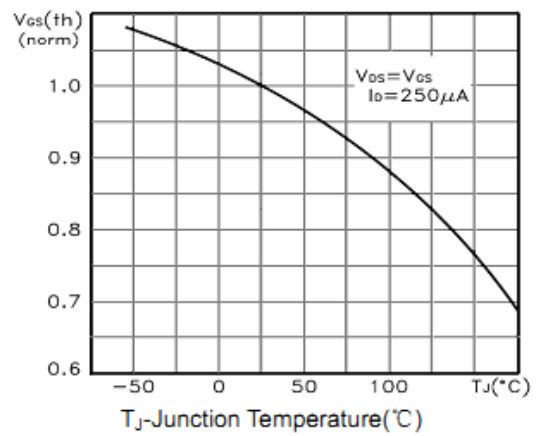


Figure 10  $V_{GS(th)}$  vs Junction Temperature

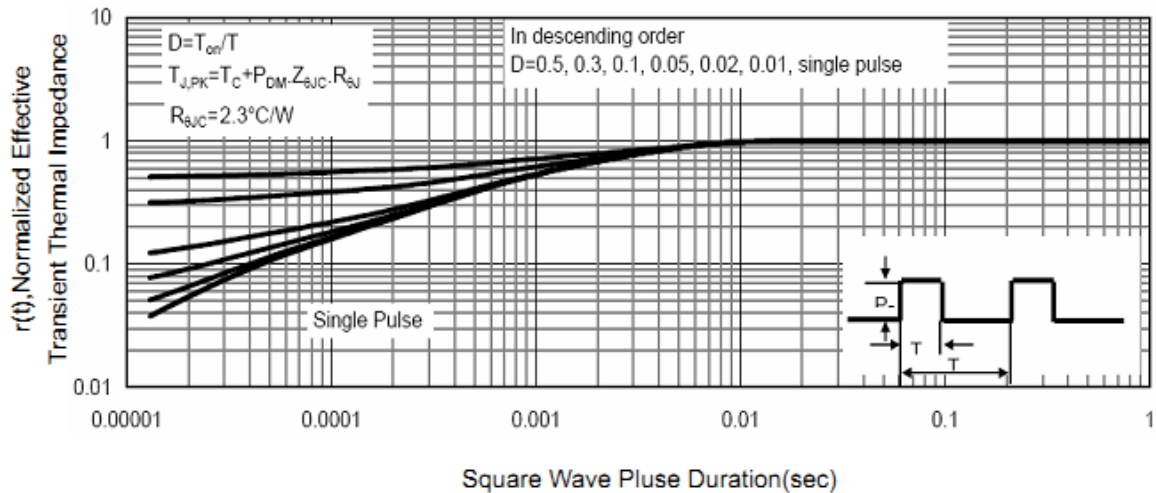


Figure 11 Normalized Maximum Transient Thermal Impedance

Typical Characteristics-SE6080S

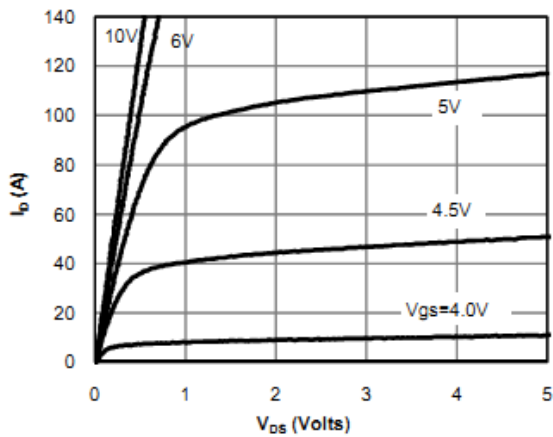


Fig 1: On-Region Characteristics (Note E)

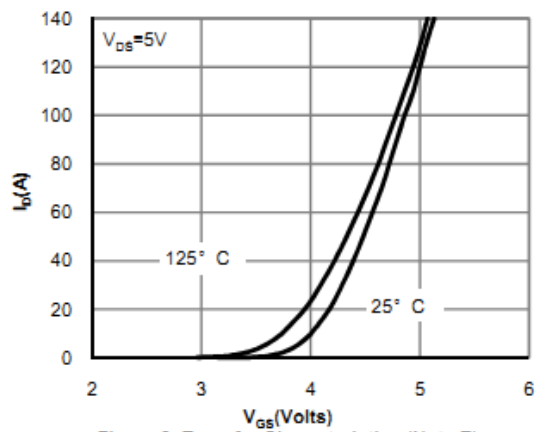


Figure 2: Transfer Characteristics (Note E)

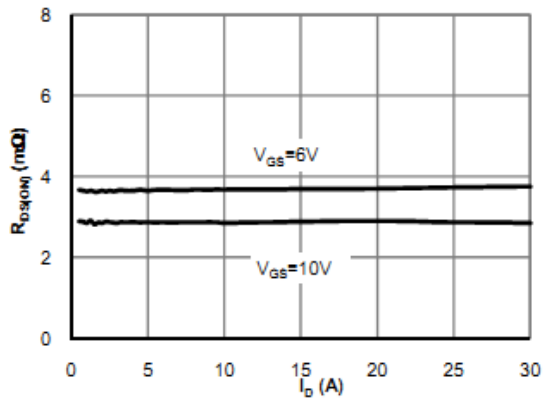


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

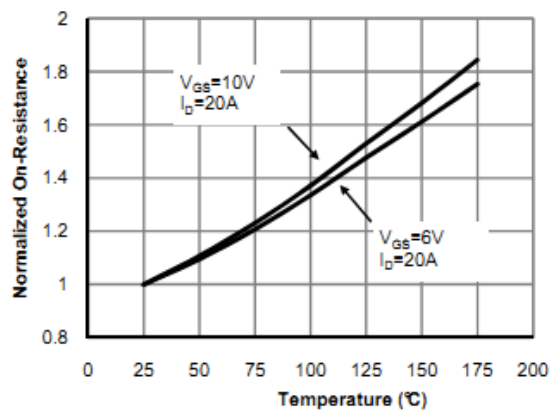


Figure 4: On-Resistance vs. Junction Temperature (Note E)

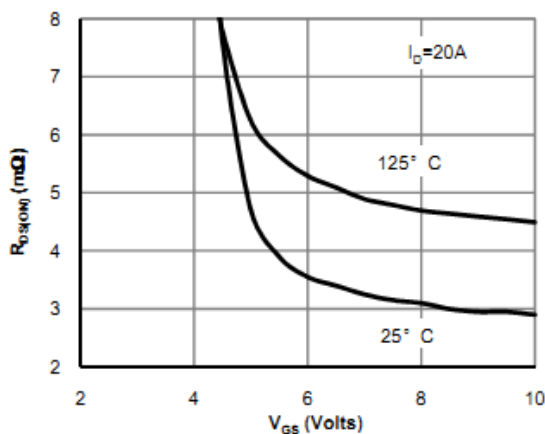


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

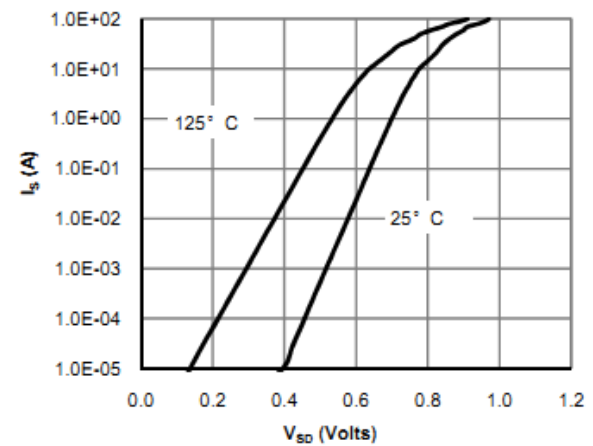


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics-SE6080S

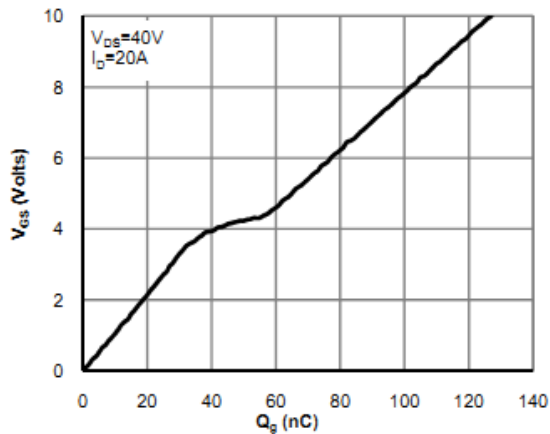


Figure 7: Gate-Charge Characteristics

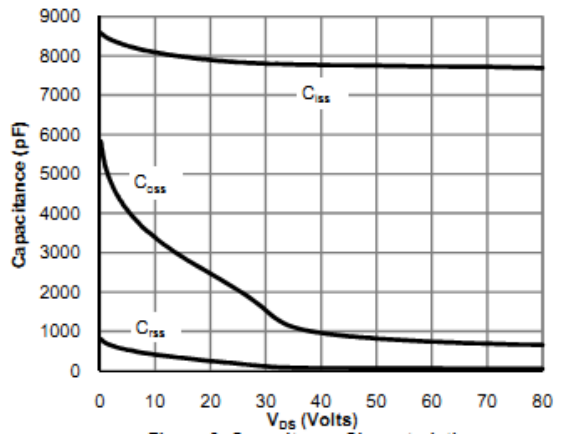


Figure 8: Capacitance Characteristics

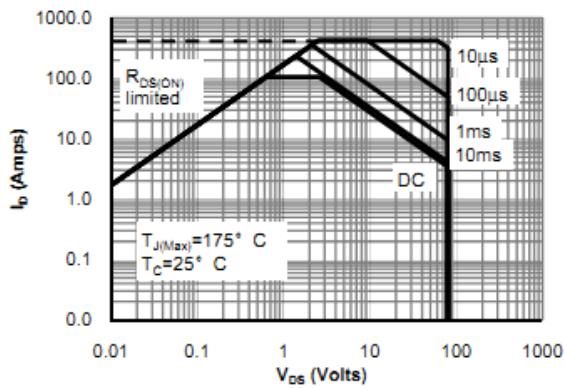


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

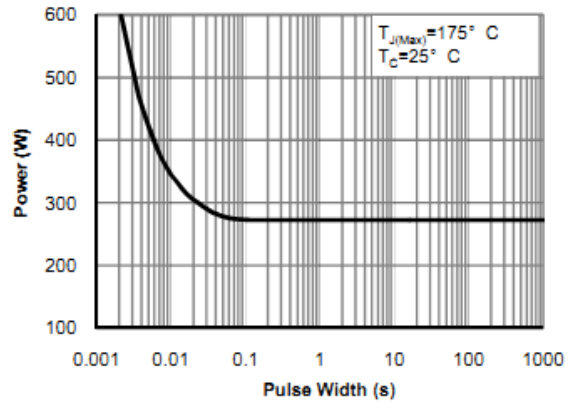


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

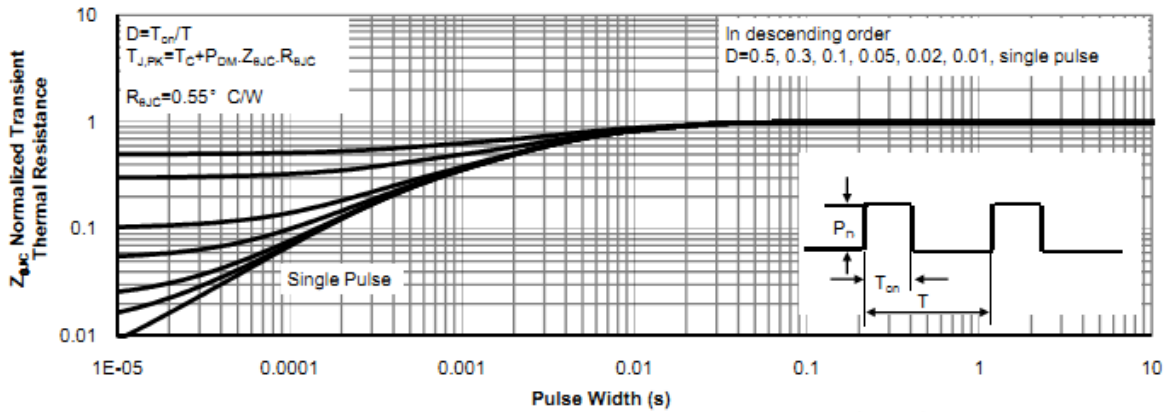
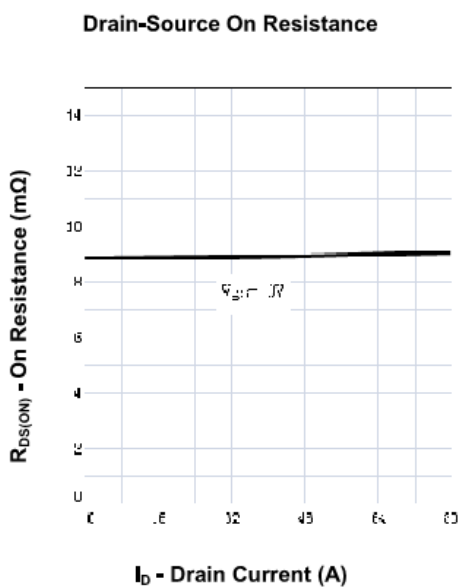
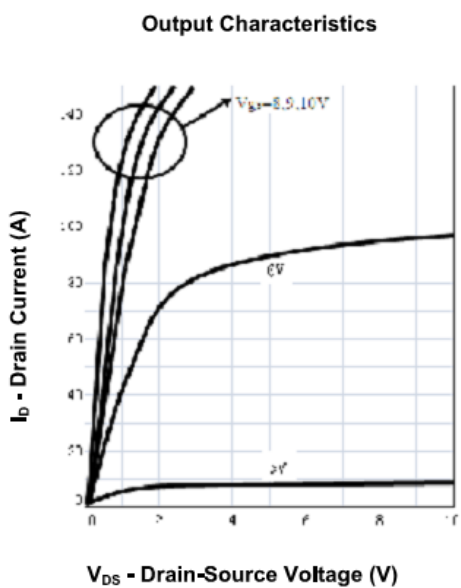
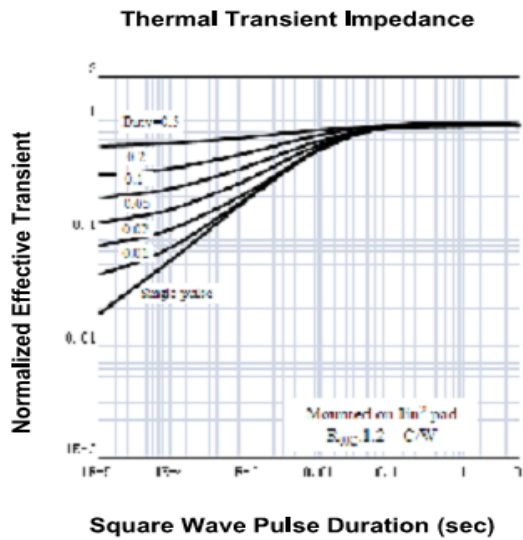
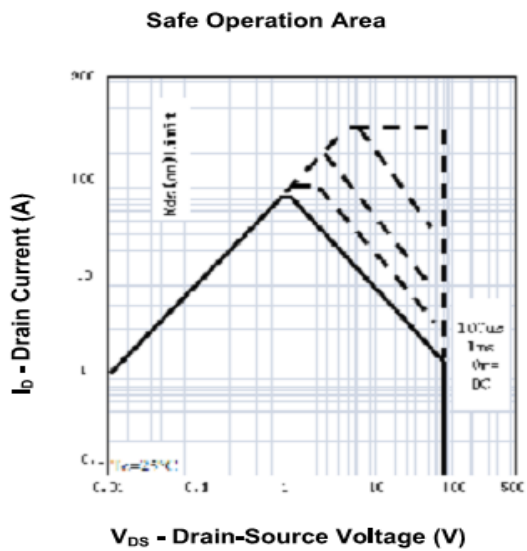
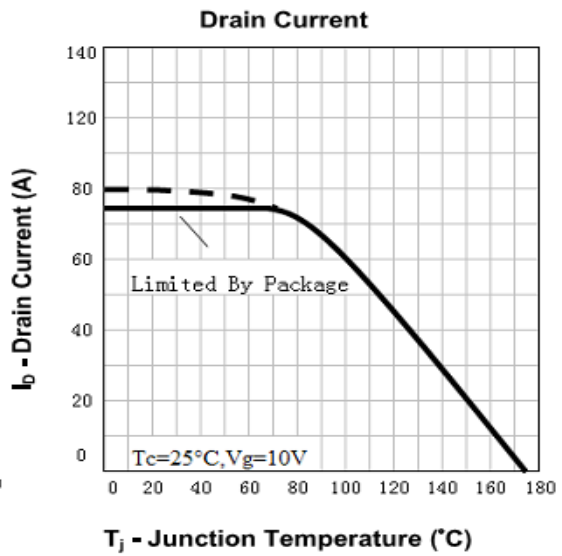
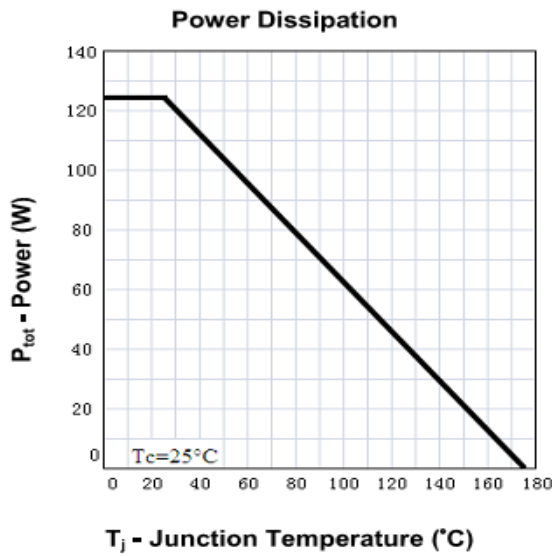


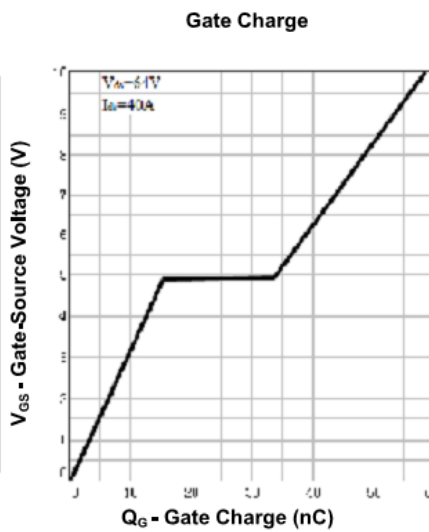
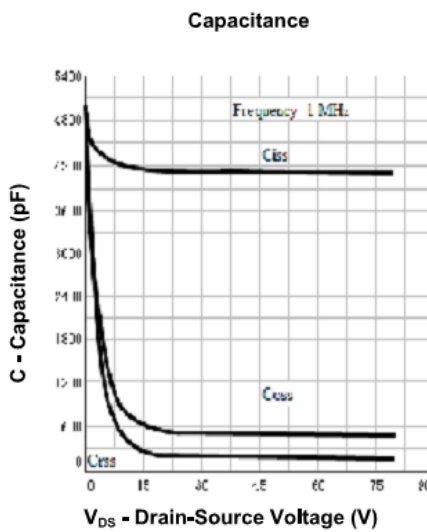
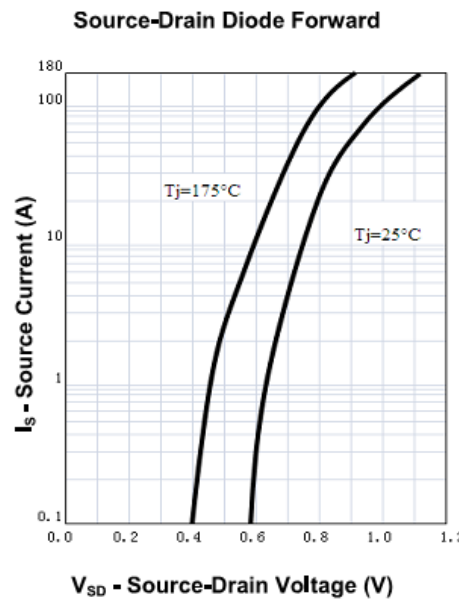
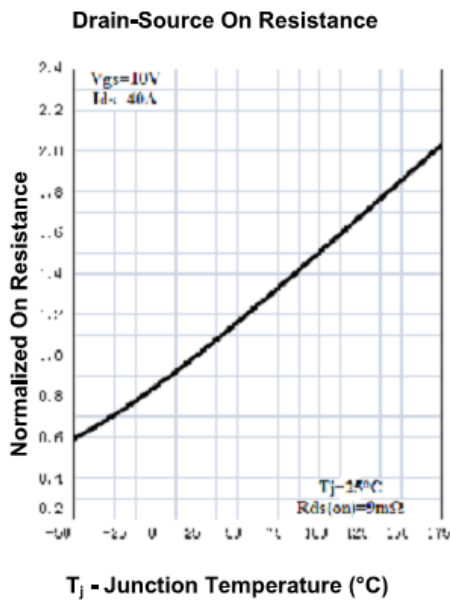
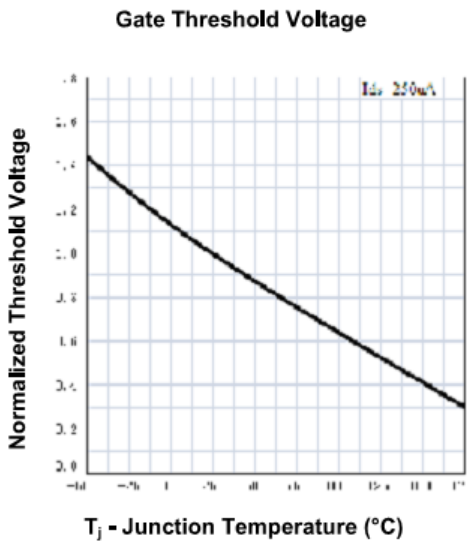
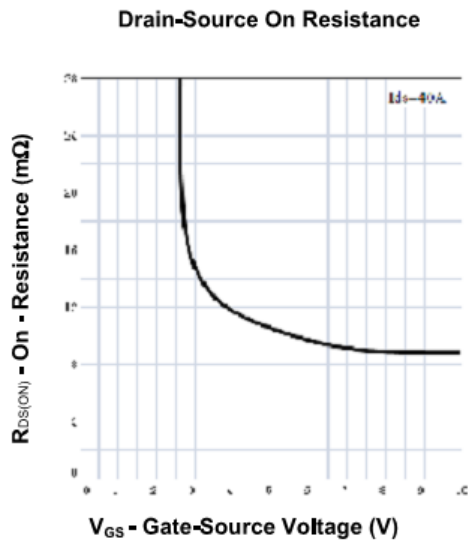
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



Typical Characteristics-SE8090S



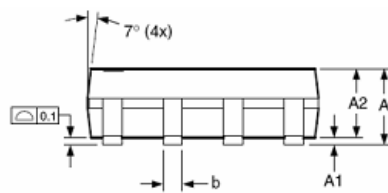
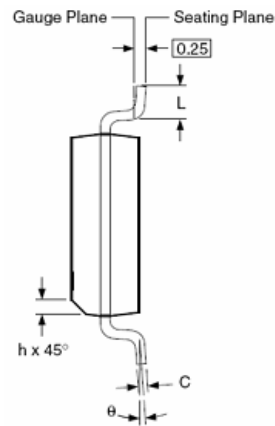
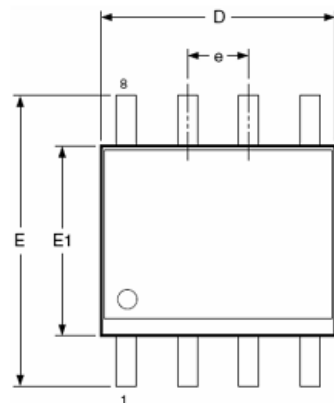
Typical Characteristics-SE8090S



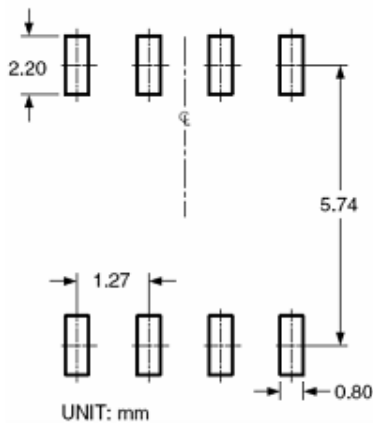
# SE4060,SE6080S,SE8090S

## Package Outline Dimension

### SOP-8



#### RECOMMENDED LAND PATTERN



#### Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	1.35	1.65	1.75
A1	0.10	—	0.25
A2	1.25	1.50	1.65
b	0.31	—	0.51
c	0.17	—	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
e	1.27 BSC		
E	5.80	6.00	6.20
h	0.25	—	0.50
L	0.40	—	1.27
θ	0°	—	8°

#### Dimensions in inches

Symbols	Min.	Nom.	Max.
A	0.053	0.065	0.069
A1	0.004	—	0.010
A2	0.049	0.059	0.065
b	0.012	—	0.020
c	0.007	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.157
e	0.050 BSC		
E	0.228	0.236	0.244
h	0.010	—	0.020
L	0.016	—	0.050
θ	0°	—	8°

#### NOTES:

1. Dimensions are inclusive of plating
2. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
3. Dimension L is measured in gauge plane.
4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

**SE4060B,SE6080S,SE8090S**

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