

P-Channel Enhancement Mode MOSFET

TDM3407

**DESCRIPTION**

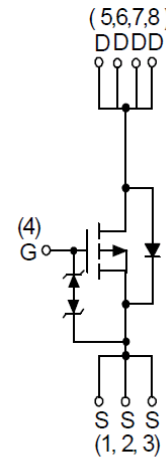
The TDM3407 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**GENERAL FEATURES**

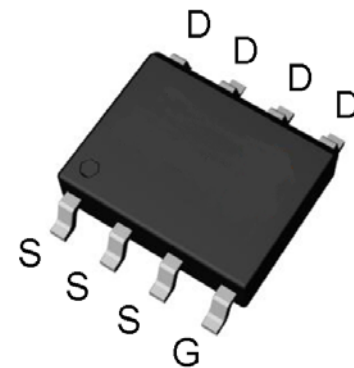
- -40V PMOS
- RDS(ON) < 17mΩ @ VGS=-4.5V  
RDS(ON) < 11mΩ @ VGS=-10V  
RDS(ON) < 9.5mΩ @ VGS=-20V
- Reliable and Rugged
- HBM ESD protection level pass 8KV
- Lead free product is available
- SOP-8 Package

**Application**

- PWM applications
- Load switch
- Power management



P-Channel MOSFET



Top View of Sop-8

**ABSOLUTE MAXIMUM RATINGS**(TA=25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V <sub>DS</sub>	-40	V
Gate-Source Voltage	V <sub>GS</sub>	±25	V
Continuous Drain Current(V <sub>GS</sub> =-10V) note1	I <sub>D</sub> (T <sub>A</sub> =25°C)	-16.5	A
	I <sub>D</sub> (T <sub>A</sub> =70°C)	-13.2	A
300µs Pulsed Drain Current Tested(V <sub>GS</sub> =-10V) note1	I <sub>DP</sub> (T <sub>A</sub> =25°C)	-66	A
Continuous Drain Current (V <sub>GS</sub> =-10V) note2	I <sub>D</sub> (T <sub>C</sub> =25°C)	-54	A
	I <sub>D</sub> (T <sub>C</sub> =100°C)	-34	A
300µs Pulsed Drain Current Tested note2	I <sub>DP</sub> (T <sub>C</sub> =25°C)	-210	A
Diode Continuous Forward Current note2	I <sub>S</sub>	-25	A
Maximum Power Dissipation note1	P <sub>D</sub> (T <sub>A</sub> =25°C)	4.2	W
	P <sub>D</sub> (T <sub>A</sub> =70°C)	2.7	W
Maximum Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to 150	°C

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Thermal Resistance-Junction to Ambient <small>note1</small>	R <sub>θJA</sub>	75	°C/W
Thermal Resistance-Junction to Lead <small>note2</small>	R <sub>θJL</sub>	24	°C/W

**NOTES:**

- Surface Mounted on 1in<sup>2</sup> pad area, t<sub>s</sub> ≤ 10sec. R<sub>θJA</sub> steady state t = 999s.
- The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub> = 150°C, and it is useful for reducing junction-to-case thermal resistance (R<sub>θJC</sub>) when additional heat sink is used.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-40	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-32, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±10	μA
<b>ON CHARACTERISTICS (Note 3)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.5	-2	-2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>DS</sub> =-15A	-	14	17	mΩ
		V <sub>GS</sub> =-10V, I <sub>DS</sub> =-25A	-	9.5	11	mΩ
		V <sub>GS</sub> =-20V, I <sub>DS</sub> =-25A	-	8.5	9.5	mΩ
<b>DYNAMIC CHARACTERISTICS (Note4)</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, F=1.0MHz	-	2780	-	PF
Output Capacitance	C <sub>oss</sub>		-	425	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	330	-	PF
<b>SWITCHING CHARACTERISTICS (Note 4)</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-20V, R <sub>L</sub> =20Ω, V <sub>GEN</sub> =-10V, R <sub>G</sub> =6 Ω I <sub>DS</sub> =-1A	-	17	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	14	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	59	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	22	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-20V, I <sub>DS</sub> =-16A, V <sub>GS</sub> =-10V	-	59	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	8	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	16	-	nC
Body Diode Reverse Recovery Time	T <sub>rr</sub>	I <sub>DS</sub> =-20A, di/dt=100A/μs	-	23	-	nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	10	-	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode Forward Voltage <small>(Note 3)</small>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>SD</sub> =-1A	-	-0.7	-1	V

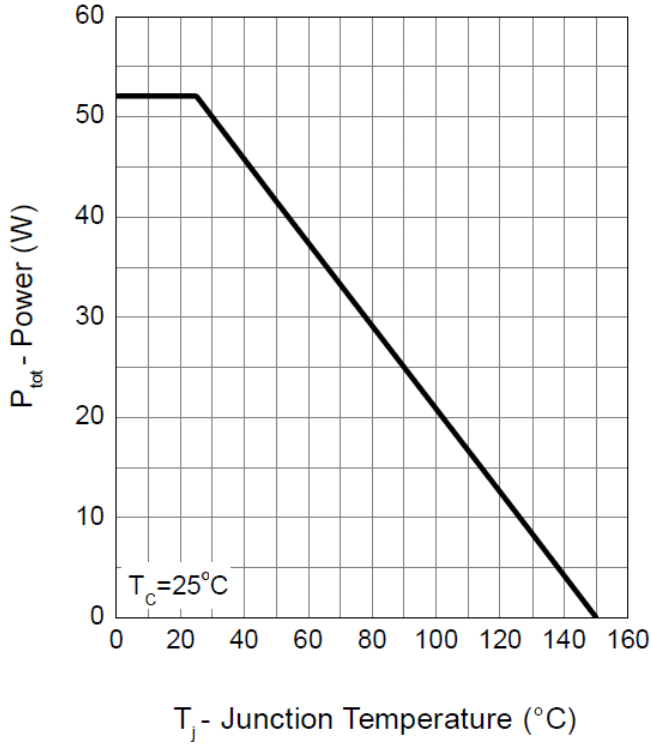
**NOTES:**

- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- Guaranteed by design, not subject to production testing

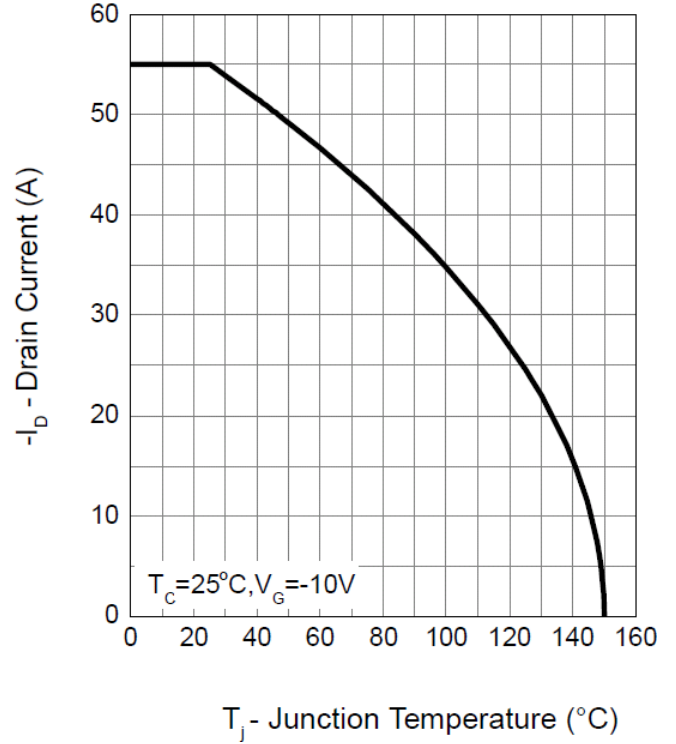
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**Typical Operating Characteristics**

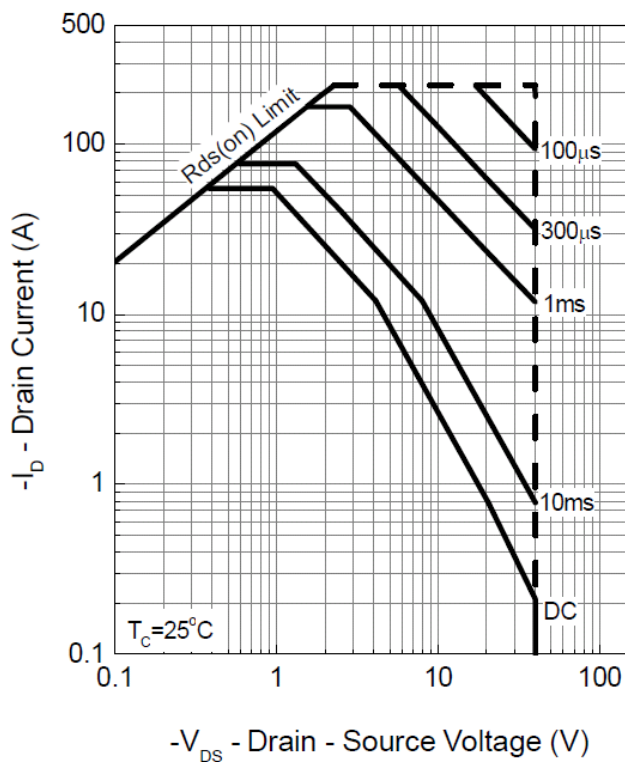
**Power Dissipation**



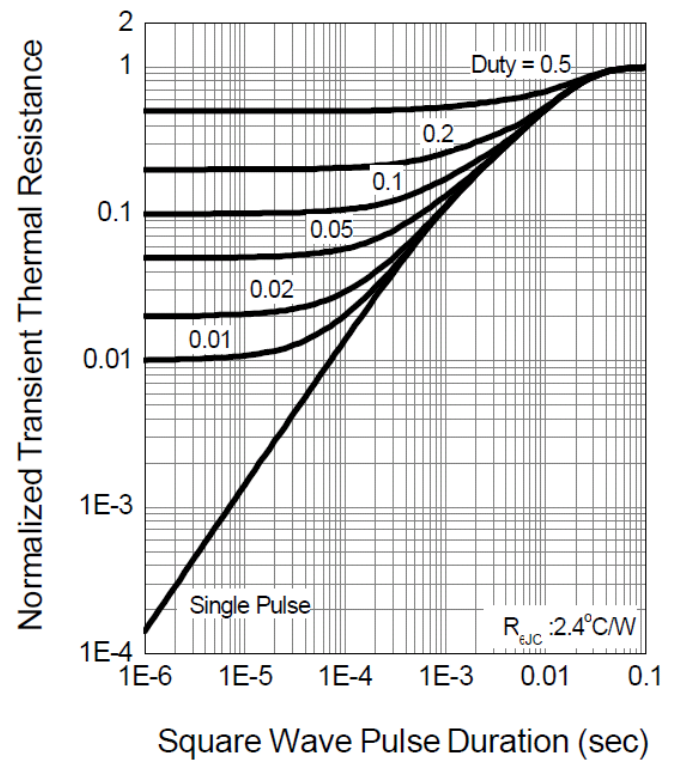
**Drain Current**



**Safe Operation Area**

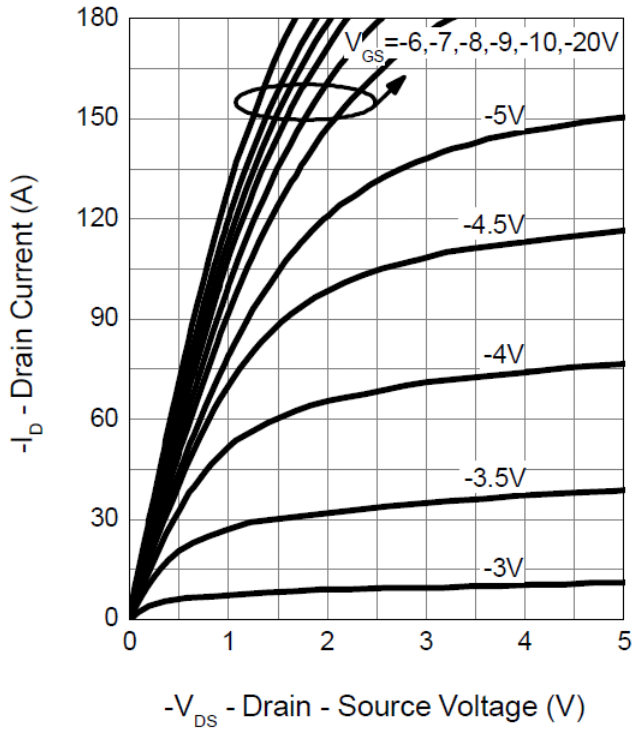


**Thermal Transient Impedance**

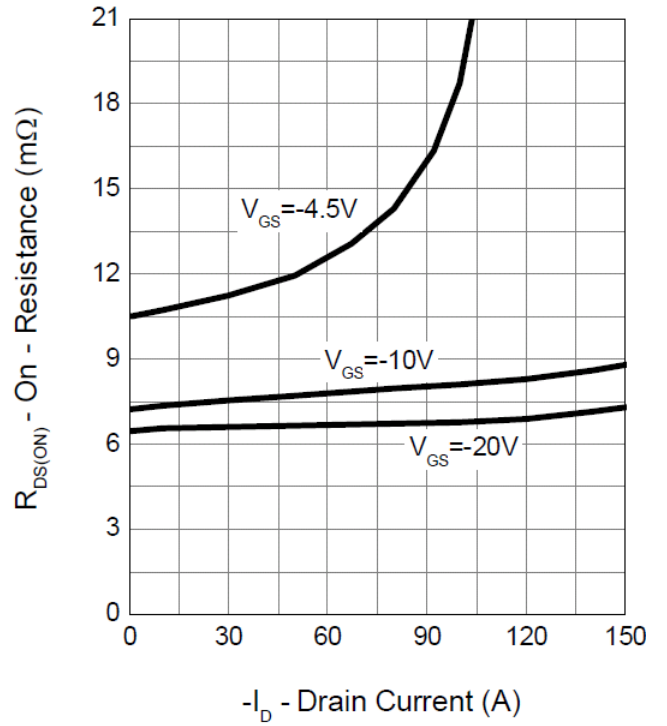


Typical Operating Characteristics(Cont.)

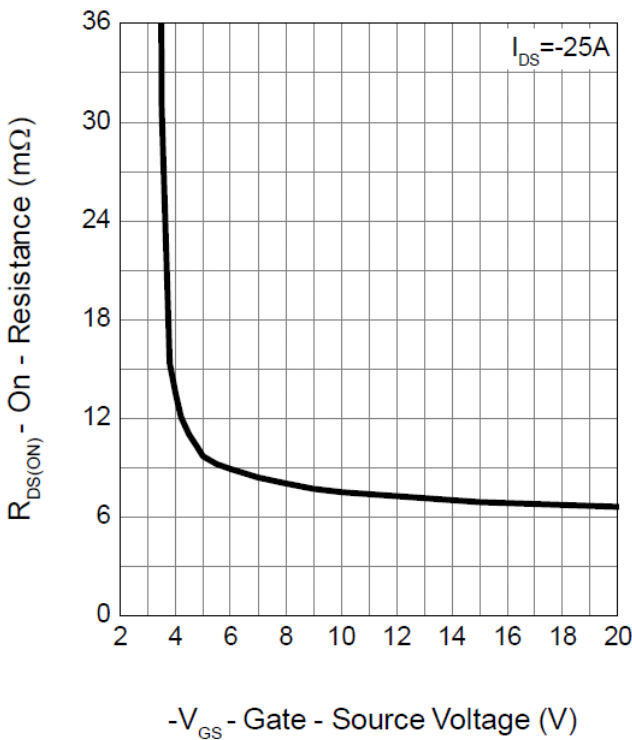
Output Characteristics



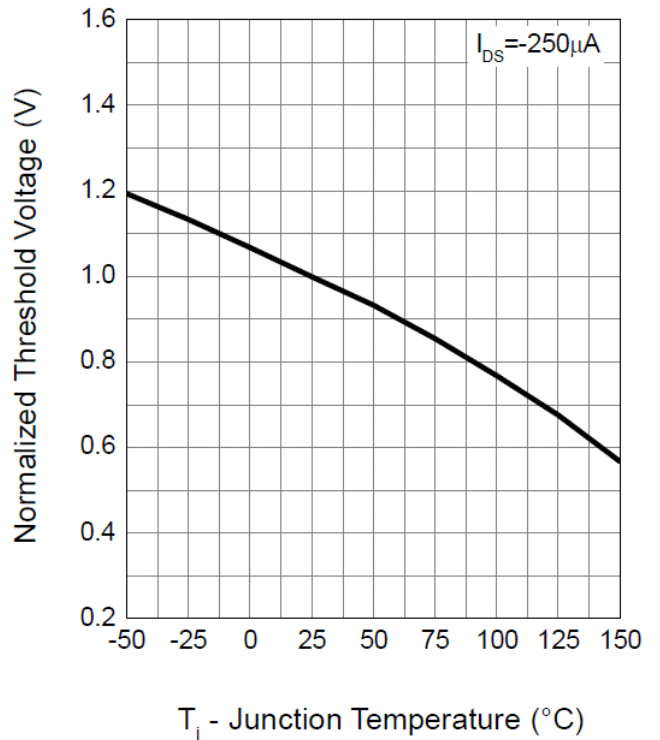
Drain-Source On Resistance



Gate-Source On Resistance



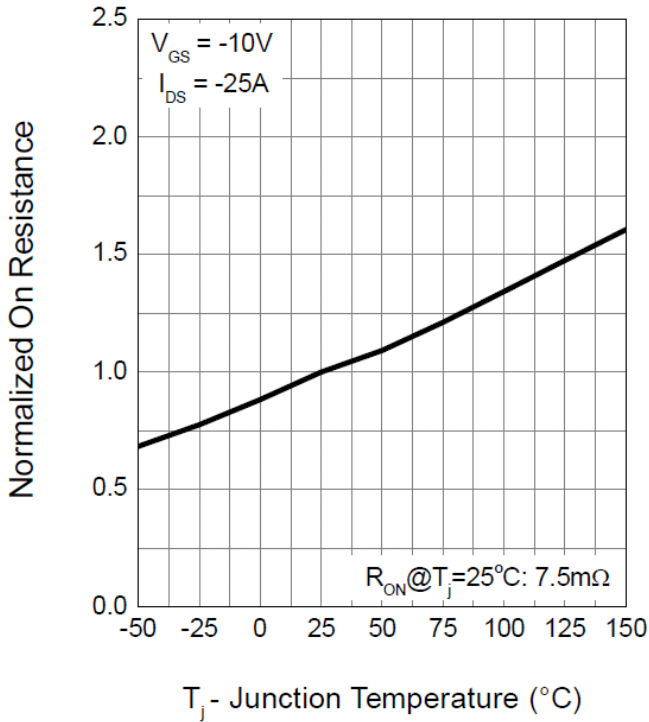
Gate Threshold Voltage



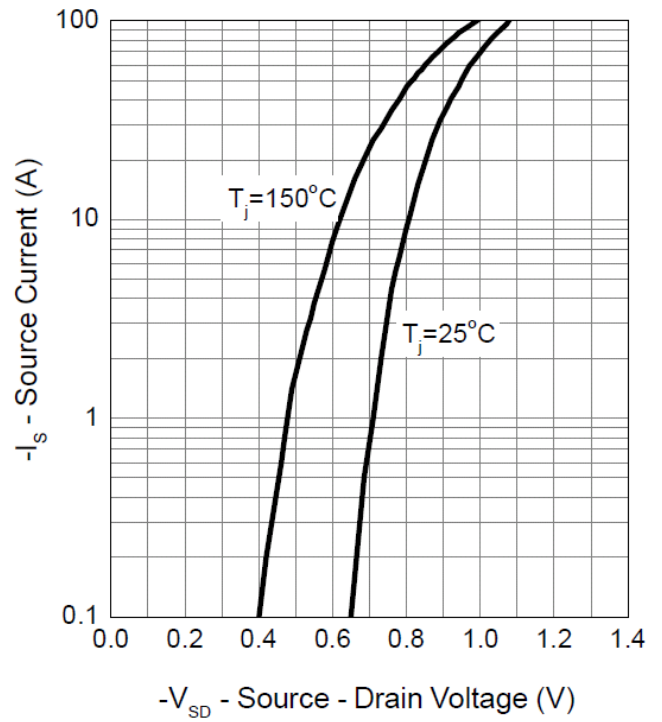
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Typical Operating Characteristics (Cont.)

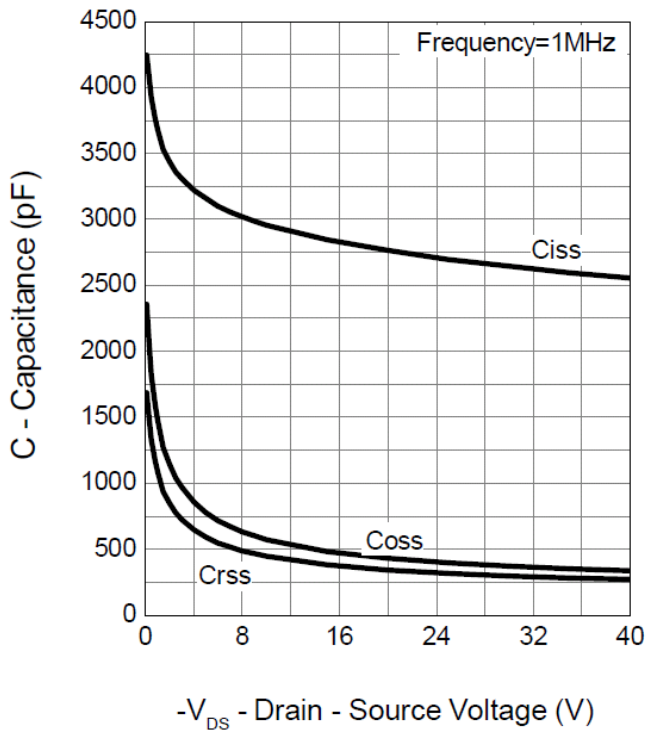
Drain-Source On Resistance



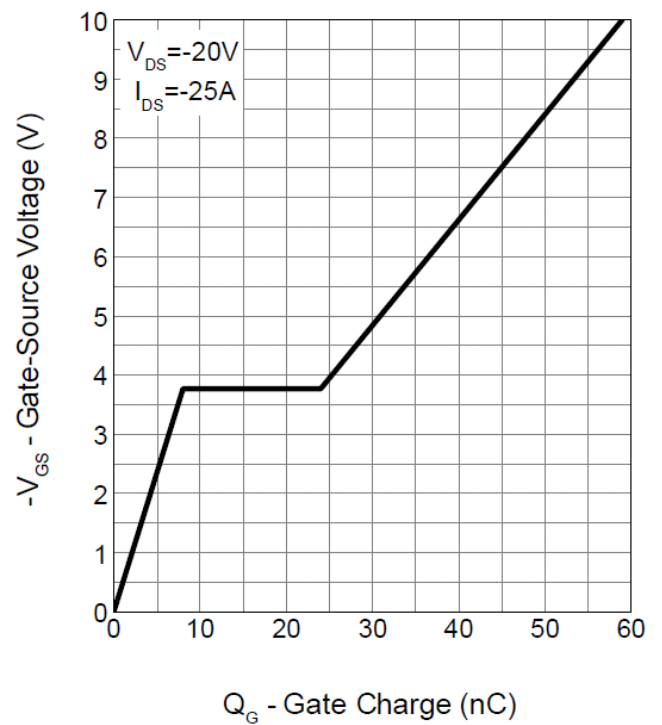
Source-Drain Diode Forward



Capacitance

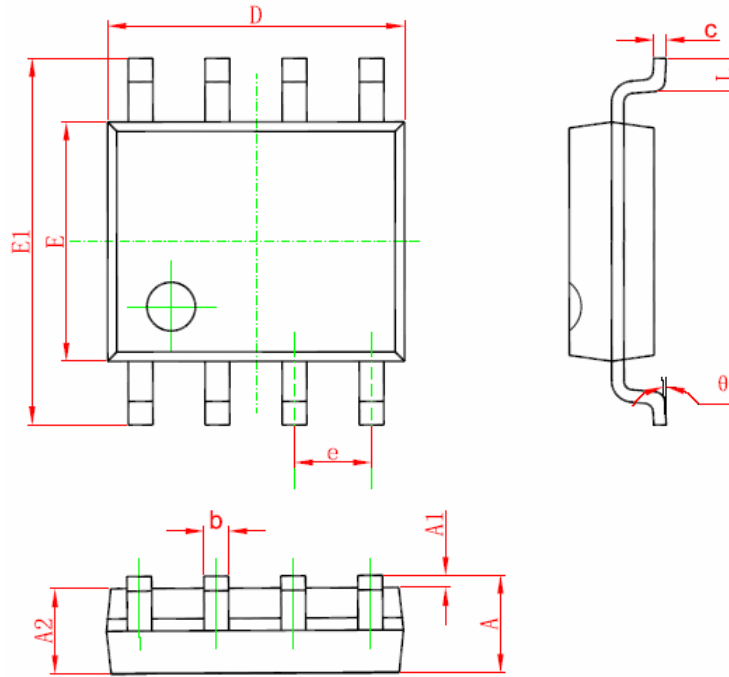


Gate Charge



Package Information

SOP-8 Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	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	0.006	0.010
D	4.700	5.100	0.185	0.200
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
θ	0°	8°	0°	8°

Design Notes