

P-Channel Enhancement Mode MOSFET

TDM3415

**DESCRIPTION**

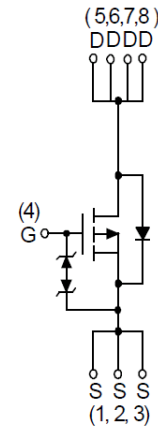
The TDM3415 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**GENERAL FEATURES**

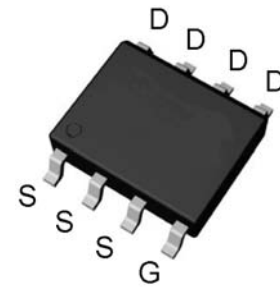
- -30V/-17.6A
- RDS(ON) < 15mΩ @ VGS=-4.5V  
RDS(ON) < 9mΩ @ VGS=-10V
- Reliable and Rugged
- HBM ESD capability level of 8KV typical
- Lead free product is available
- DFN5X6 Package

**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>	-30	V
Gate-Source Voltage	V <sub>GS</sub>	±25	V
Continuous Drain Current (V <sub>GS</sub> =-10V) (note1)	I <sub>D</sub> (TA=25°C)	-17.6	A
	I <sub>D</sub> (TA=70°C)	-14	A
300µs Pulsed Drain Current Tested (note1)	I <sub>DP</sub> (TA=25°C)	-70	A
Diode Continuous Forward Current (note2)	I <sub>S</sub>	-4	A
Maximum Power Dissipation (note1)	P <sub>D</sub> (TA=25°C)	4.2	W
	P <sub>D</sub> (TA=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
Thermal Resistance-Junction to Ambient (note1)	RθJA (t≤10s)	30	°C/W
	RθJA (Steady State)	75	°C/W
Thermal Resistance-Junction to Lead	RθJL (Steady State)	24	°C/W

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**TDM3415**
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>ON CHARACTERISTICS</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_{DS}=-10A$	-	11	15	$m\Omega$
		$V_{GS}=-10V, I_{DS}=-17.6A$	-	7	9	$m\Omega$
<b>DYNAMIC CHARACTERISTICS</b> (Note 4)						
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	8	-	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1.0MHz$	-	2110	-	PF
Output Capacitance	$C_{oss}$		-	425	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	330	-	PF
<b>SWITCHING CHARACTERISTICS</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, R_L=15\Omega, V_{GEN}=-10V, R_G=6\Omega, I_{DS}=-1A$	-	12	-	nS
Turn-on Rise Time	$t_r$		-	14	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	98	-	nS
Turn-Off Fall Time	$t_f$		-	60	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_{DS}=-17.6A, V_{GS}=-10V$	-	45	-	nC
Gate-Source Charge	$Q_{gs}$		-	5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	12.7	-	nC
Body Diode Reverse Recovery Time	$T_{rr}$	$I_{DS}=-17.6A, di/dt=100A/\mu s$	-	24	-	nS
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	16	-	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_{SD}=-1A$	-	-0.7	-1	V

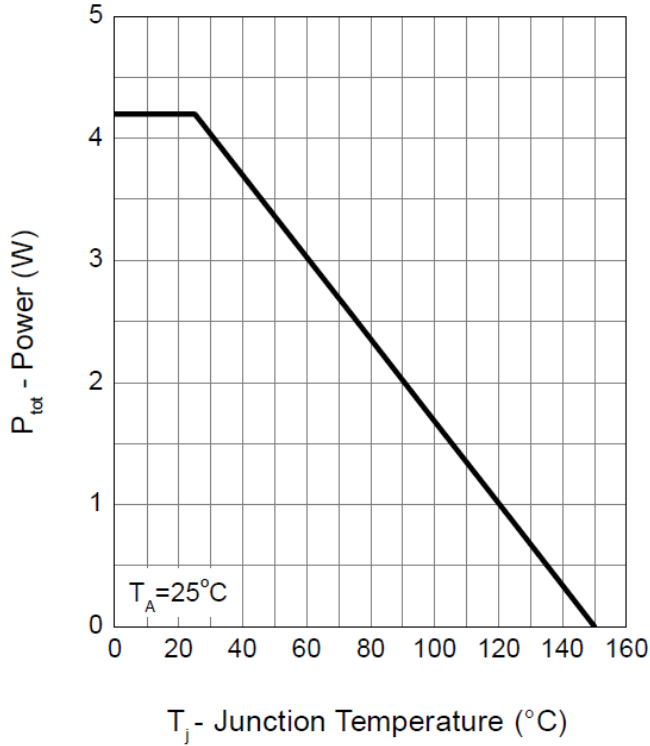
**NOTES:**

- Surface Mounted on  $1in^2$  pad area,  $t_s \leq 10sec$ .  $R_{\theta JA}$  steady state  $t = 999s$ .
- The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 150^{\circ}\text{C}$ , and it is useful for reducing junction-to-case thermal resistance ( $R_{\theta JC}$ ) when additional heat sink is used.
- Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing

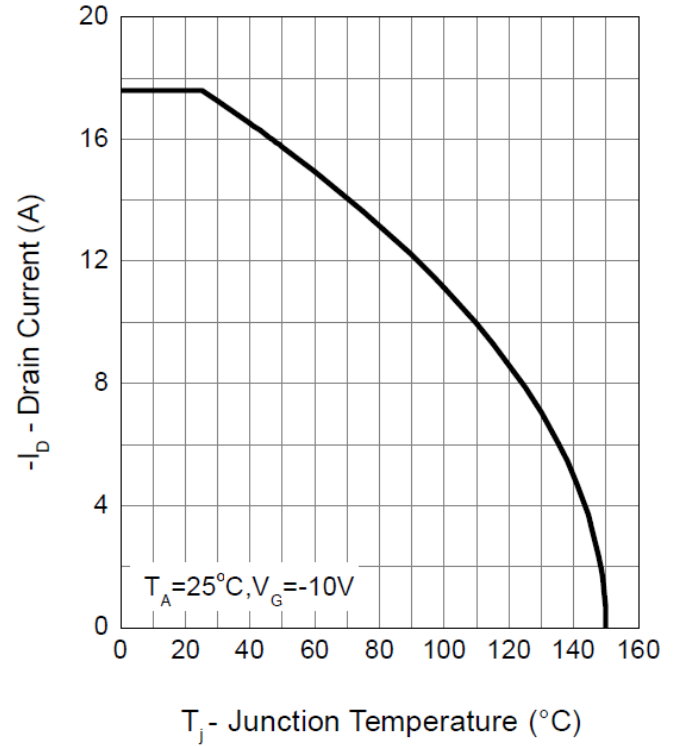
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Typical Operating Characteristics

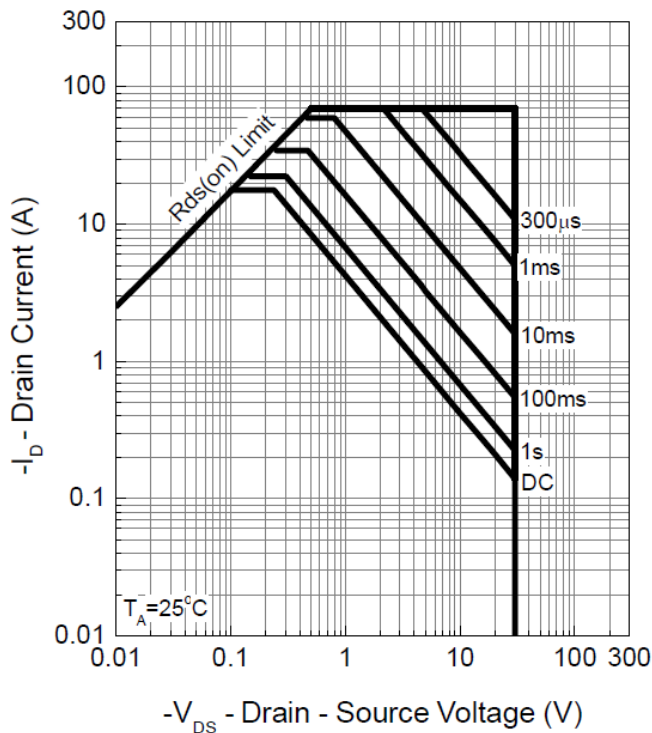
Power Dissipation



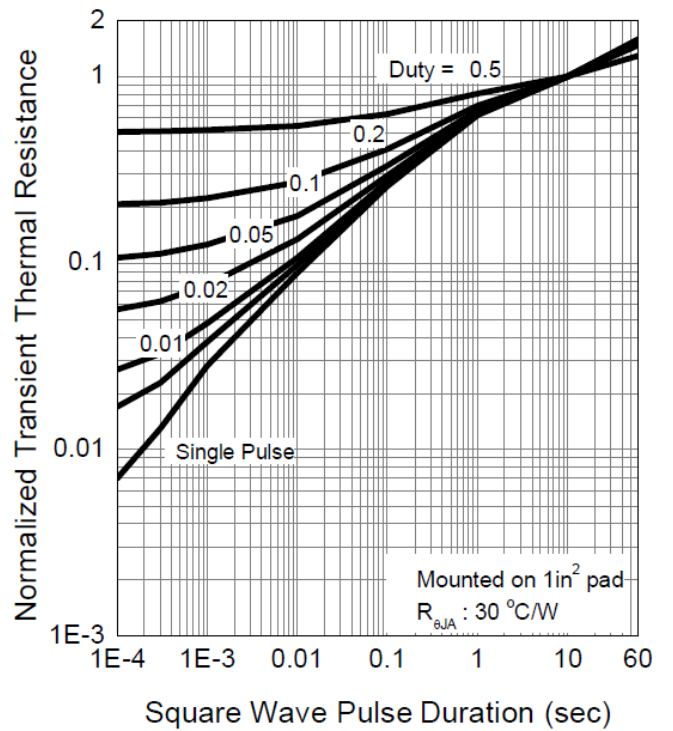
Drain Current



Safe Operation Area

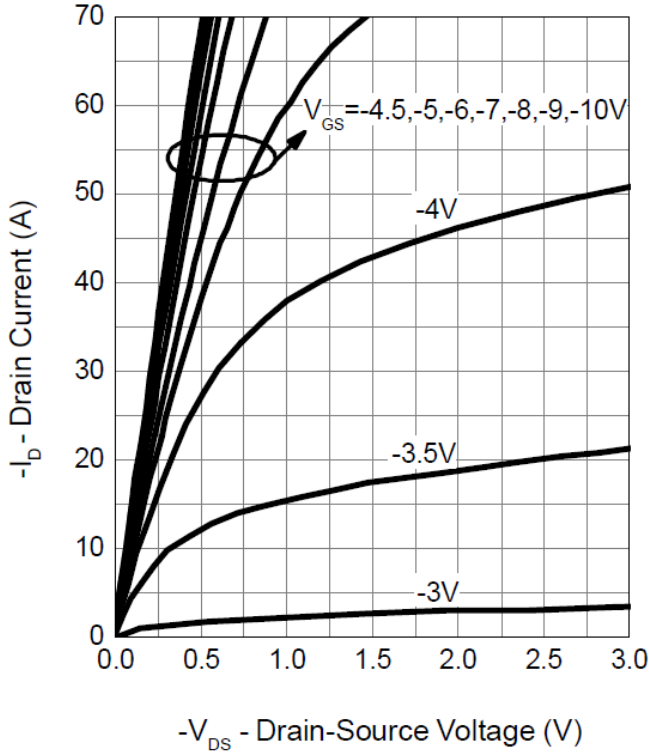


Thermal Transient Impedance

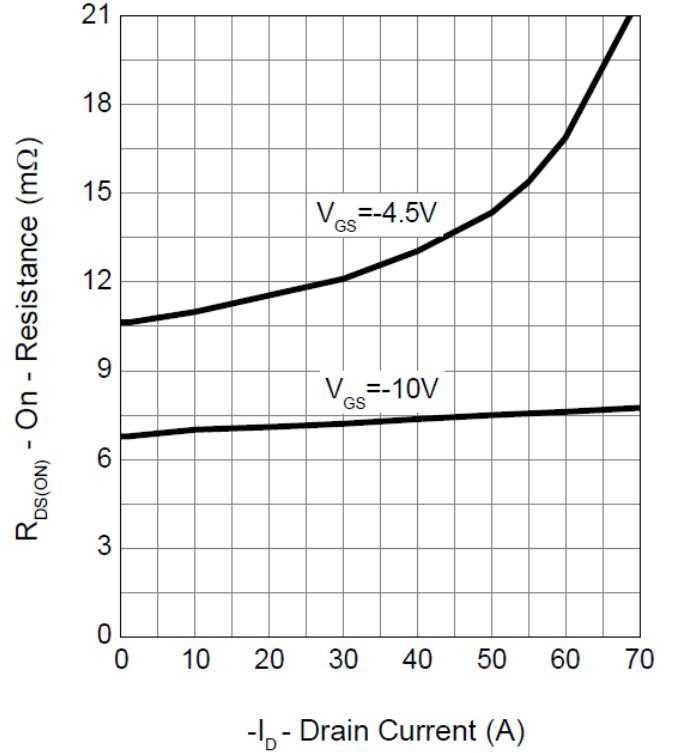


Typical Operating Characteristics(Cont.)

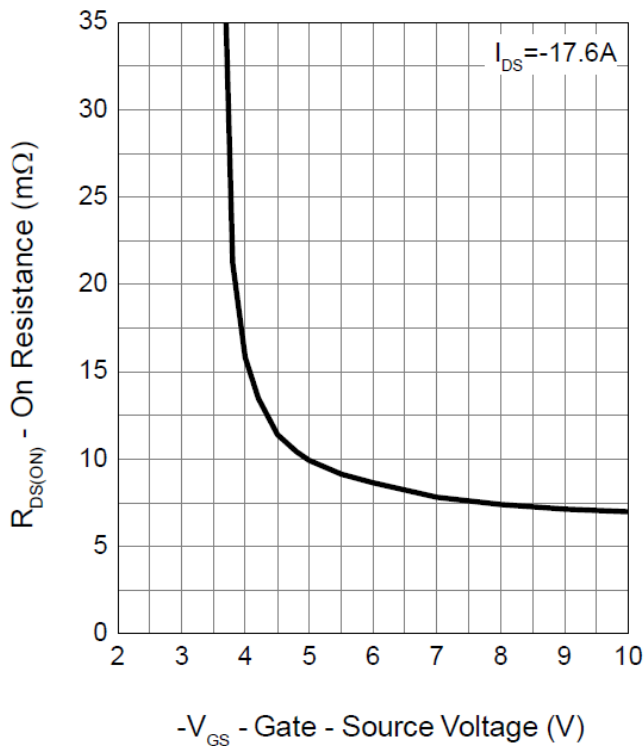
Output Characteristics



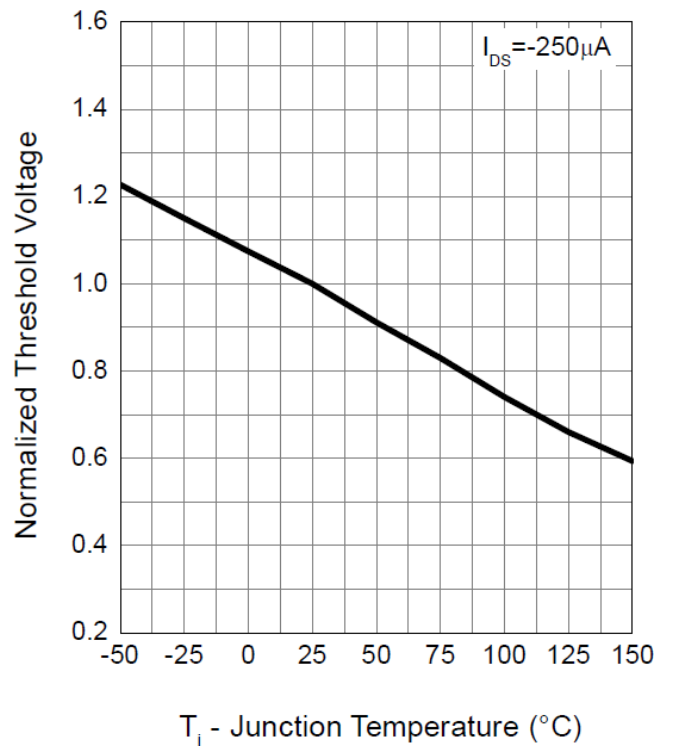
Drain-Source On Resistance



Gate-Source On Resistance

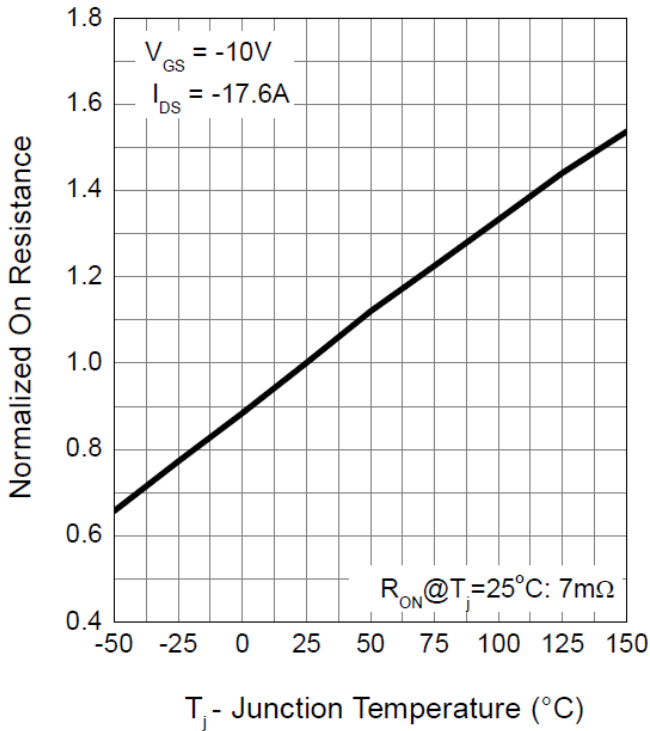


Gate Threshold Voltage

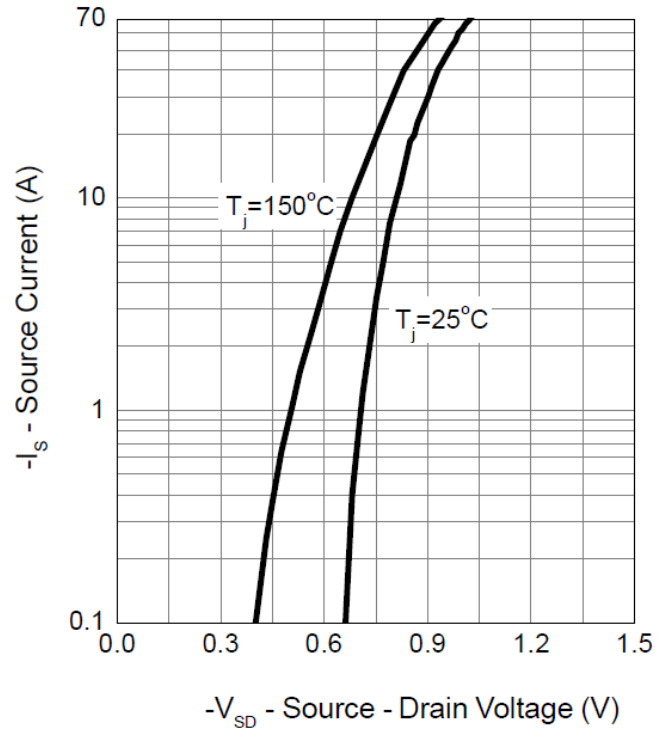


Typical Operating Characteristics (Cont.)

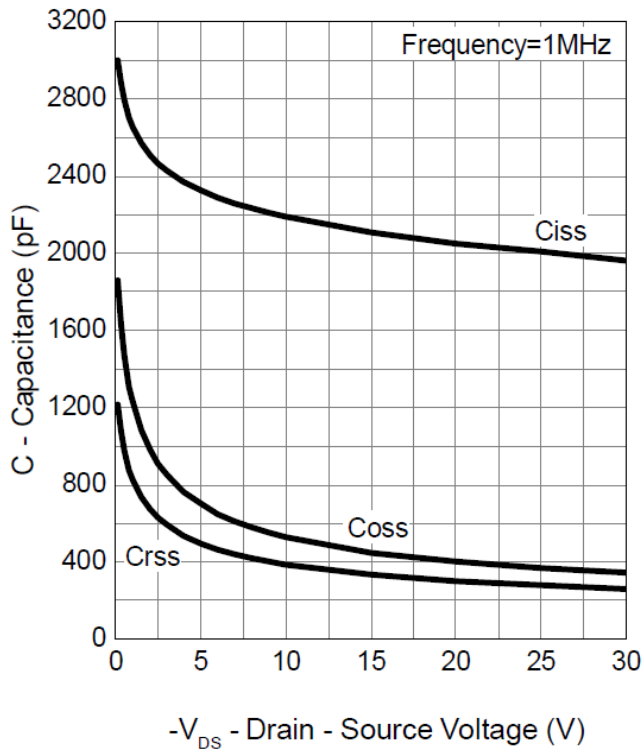
Drain-Source On Resistance



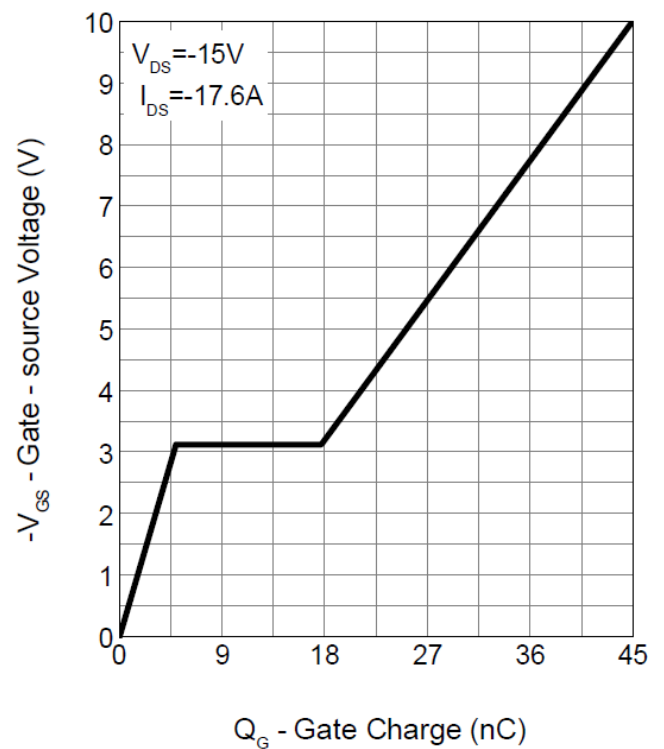
Source-Drain Diode Forward



Capacitance

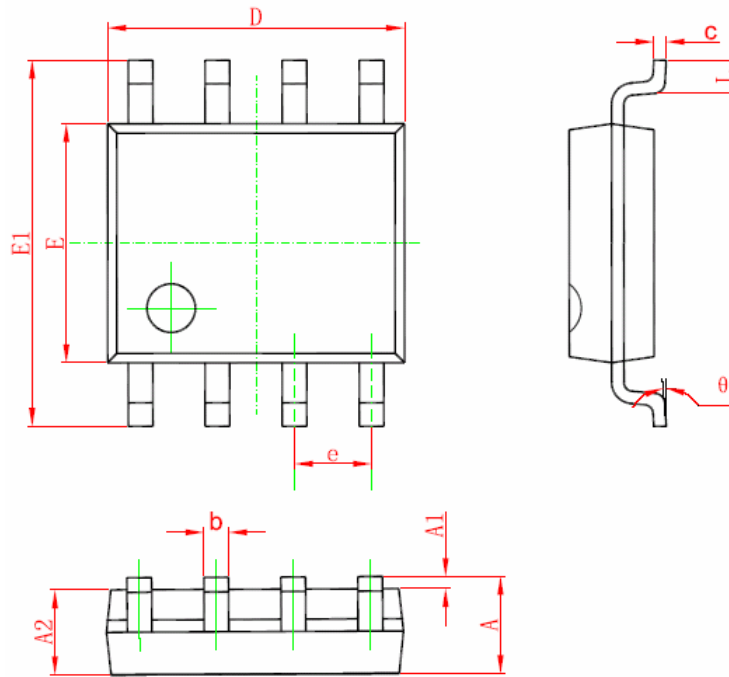


Gate Charge



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