N-Channel Enhancement Mode MOSFET TDM31050

DESCRIPTION

The TDM31050 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.
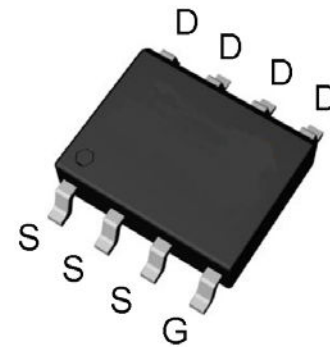
GENERAL FEATURES

- RDS(ON) < 13.3mΩ @ VGS=4.5V
  RDS(ON) < 10.5mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- SOP-8 Package

Application

- PWM applications
- Load switch
- Power management
- Hard Switched and High Frequency Circuits
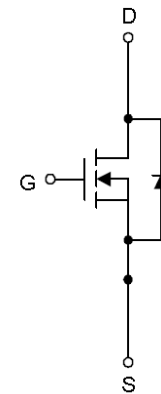
N-Channel MOSFET

Top View of SOP-8

泰德半导体--提供样品，技术支持 手机13418601901 QQ409545144

ABSOLUTE MAXIMUM RATINGS(T$_A$=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V$_{DS}$	100	V
Gate-Source Voltage	V$_{GS}$	±20	V
Diode Continuous Forward Current	I$_S$（T$_A$=25℃）	4	A
Drain Current @ Continuous	I$_D$（T$_A$=25℃）	12	A
	I$_D$（T$_A$=70℃）	9.7	A
Drain Current @ Current-Pulsed (Note 1)	I$_{DM}$（T$_A$=25℃）	34	A
Maximum Power Dissipation	P$_D$(T$_A$=25℃)	3.1	W
	P$_D$(T$_A$=70℃)	2.0	W
Thermal Resistance,Junction-to-Ambient (Note 1)	R$_{θJA}$(t≤10S)	40	℃/W
	R$_{θJA}$(Steady State)	80	℃/W
Avalanche Current, Single pulse	I$_{AS}$(L=0.5mH)	25	A
Avalanche Energy, Single pulse	E$_{AS}$(L=0.5mH)	156	mJ
Maximum Operating Junction Temperature	T$_J$	150	℃
Storage Temperature Range	T$_{STG}$	-55 To 150	℃

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ELECTRICAL CHARACTERISTICS (T$_A$=25℃ unless otherwise noted)

| Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V I$_D$=250μA	100			V
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$=80V,V$_{GS}$=0V			1	μA
Gate-Body Leakage Current	I$_{GSS}$	V$_{GS}$=±20V,V$_{DS}$=0V			±100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$=VGS,I$_D$=250μA	1	2	3	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=4.5V, I$_D$=6A		10.2	13.3	mΩ
	R$_{DS(ON)}$	V$_{GS}$=10V, I$_D$=25A		8.7	10.5	mΩ
DYNAMIC CHARACTERISTICS (Note3)						
Gate Resistance	R$_G$	V$_{DS}$=0V,V$_{GS}$=0V, F=1.0MHz		1.0		Ω
Input Capacitance	C$_{iss}$	V$_{DS}$=30V,V$_{GS}$=0V, F=1.0MHz		2310	3000	PF
Output Capacitance	C$_{oss}$			690		PF
Reverse Transfer Capacitance	C$_{rss}$			50		PF
SWITCHING CHARACTERISTICS (Note 3)						
Turn-on Delay Time	t$_{d(on)}$	V$_{DS}$=30V, R$_L$=30Ω, V$_{GEN}$=10V,R$_G$=6Ω I$_D$=1A		15	27	nS
Turn-on Rise Time	t$_r$			9	17	nS
Turn-Off Delay Time	t$_{d(off)}$			51	90	nS
Turn-Off Fall Time	t$_f$			65	116	nS
Total Gate Charge	Q$_g$	V$_{DS}$=50V,I$_D$=9A,V$_{GS}$=4.5V		44	62	nC
Gate-Source Charge	Q$_{gs}$			8		nC
Gate-Drain Charge	Q$_{gd}$			9		nC
Body Diode Reverse Recovery Time	T$_{rr}$	I$_F$=9A, dI/dt=100A/μs		52		nS
Body Diode Reverse Recovery Charge	Q$_{rr}$			82		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V$_{SD}$	V$_{GS}$=0V,I$_S$=2A		0.8	1.3	V

NOTES:

1. Pulse width limited by max. junction temperature.

2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

3. Guaranteed by design, not subject to production testing

N-Channel Enhancement Mode MOSFET

TDM31050

Typical Operating Characteristics
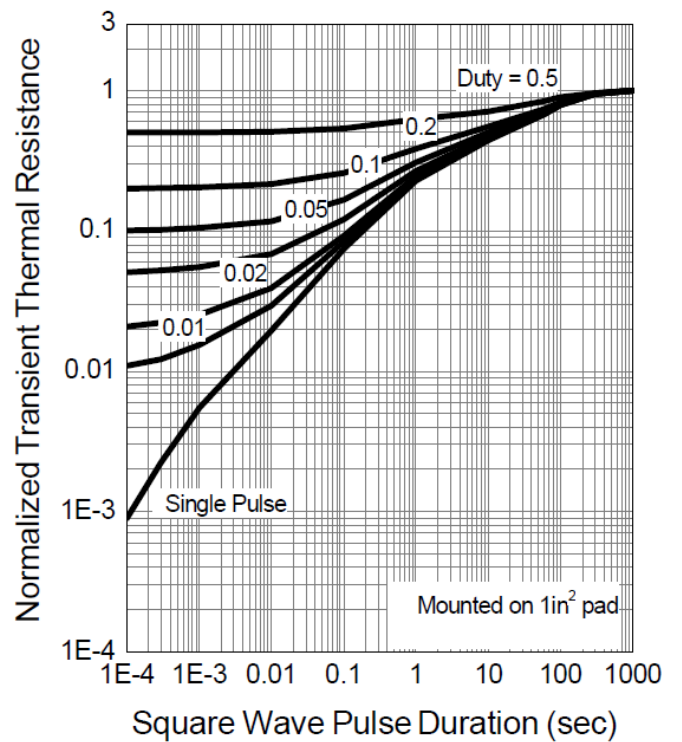
Power Dissipation
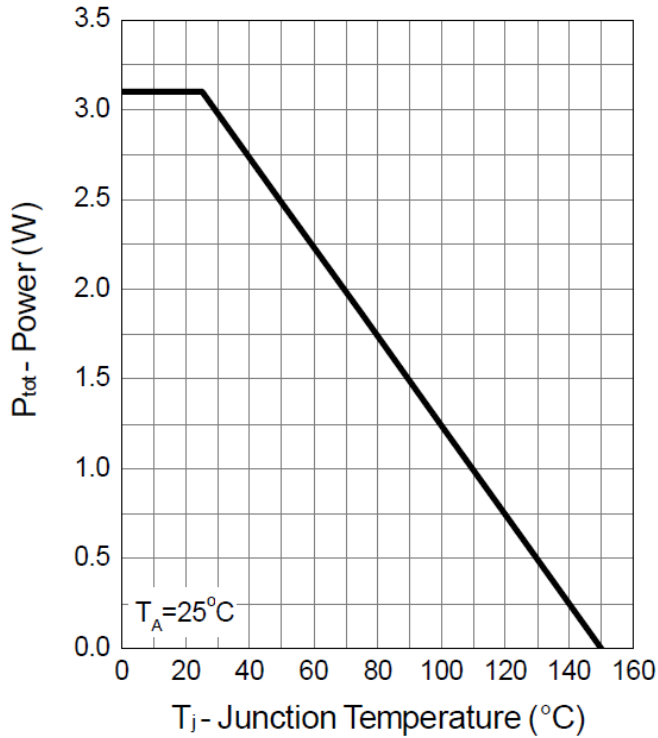
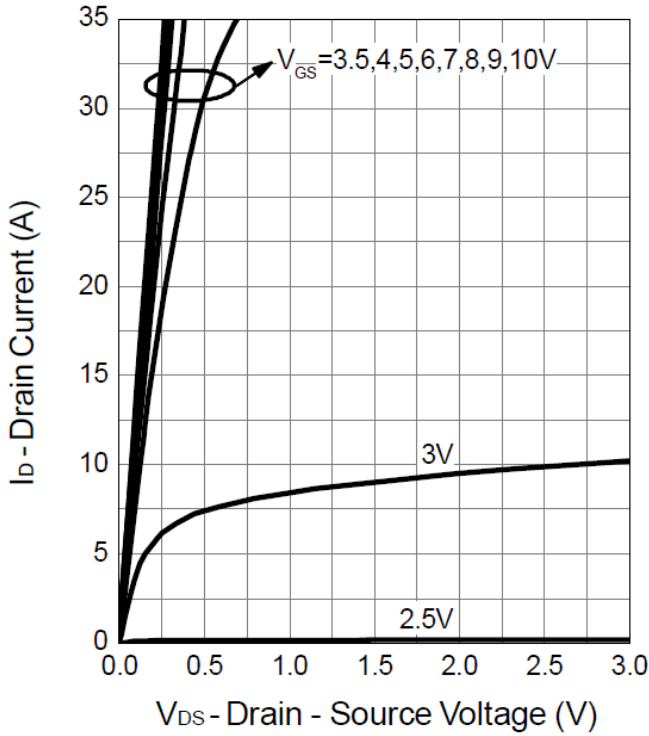### Drain Current
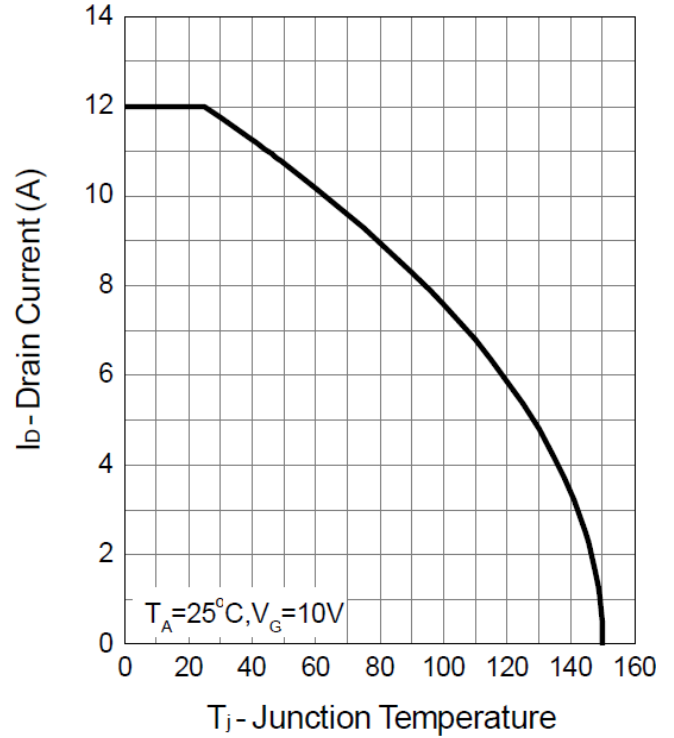
Safe Operation Area
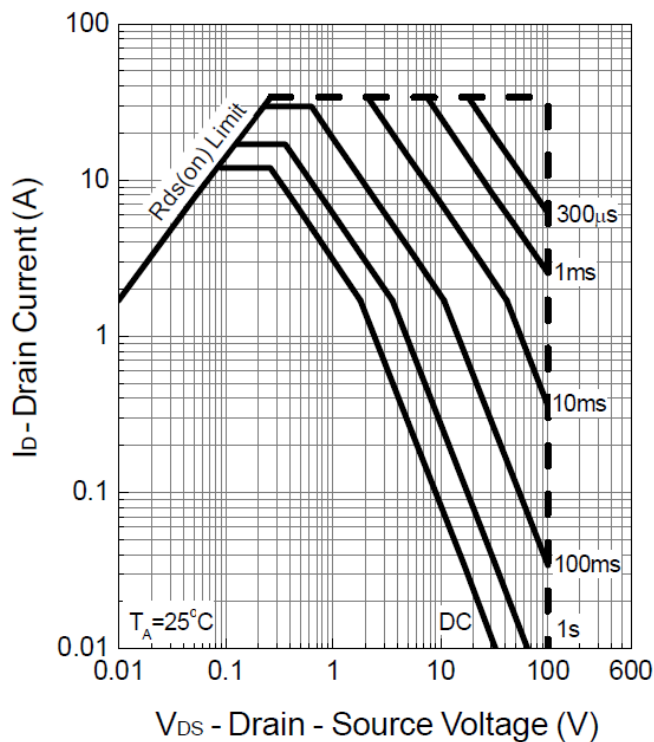
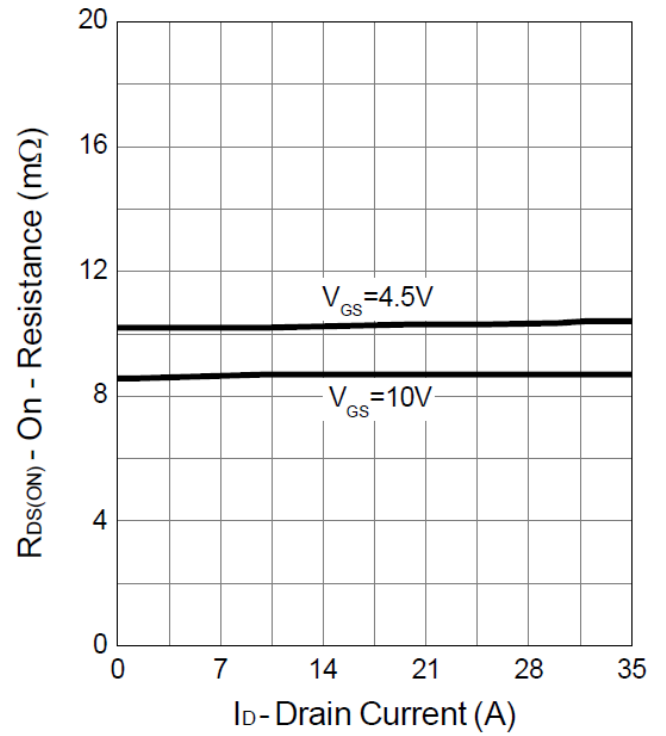### Thermal Transient Impedance

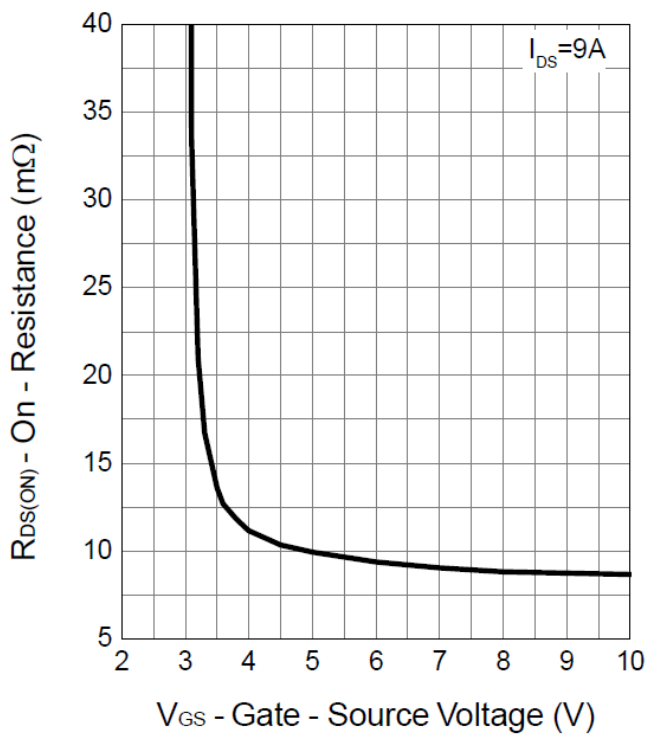## Typical Operating Characteristics (Cont.)

Output Characteristics

Drain-Source On Resistance

Gate-Source On Resistance

Gate Threshold Voltage

N-Channel Enhancement Mode MOSFET — TDM31050
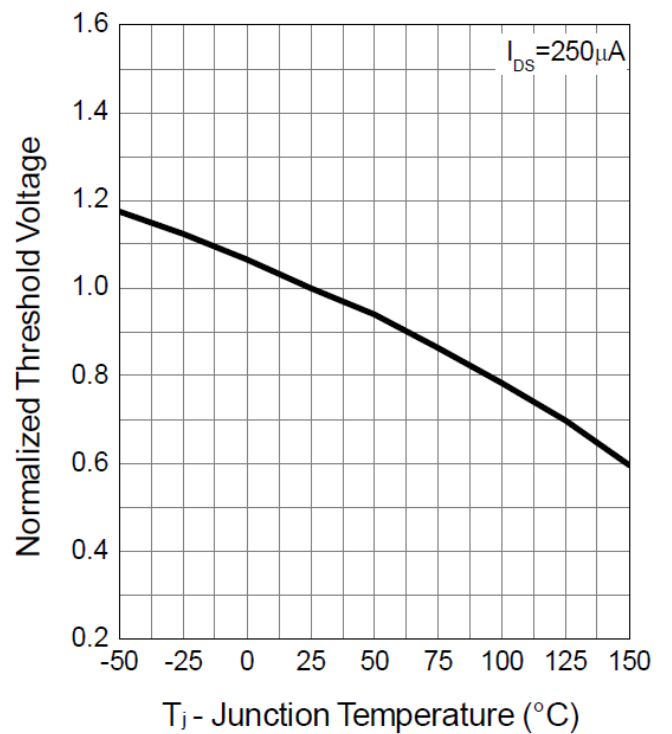
Typical Operating Characteristics (Cont.)

Drain-Source On Resistance

$V_{GS} = 10V$
$I_{DS} = 9A$

$R_{ON}@T_j=25^{\circ}C: 8.7m\Omega$

Normalized On Resistance vs T_j- Junction Temperature ($^{\circ}$C)
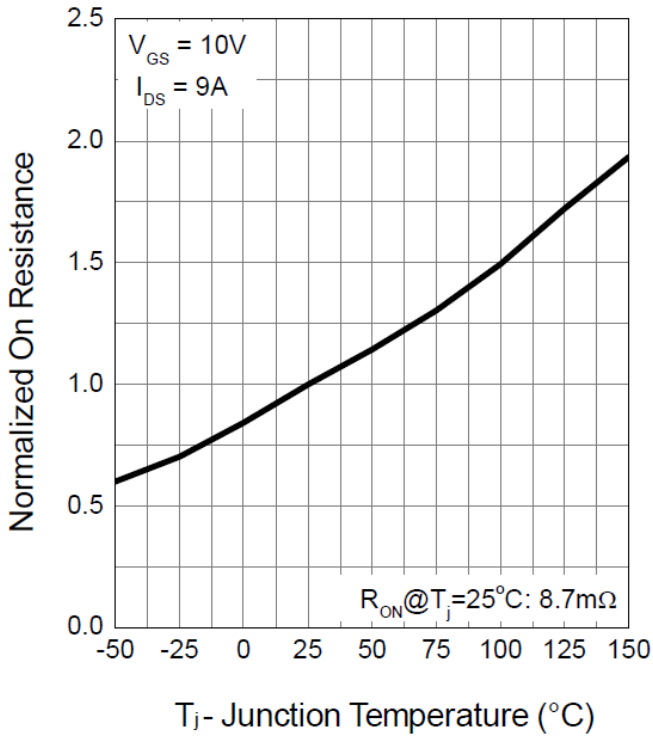
Source-Drain Diode Forward

$T_j=150^{\circ}C$

$T_j=25^{\circ}C$

I_s - Source Current (A) vs V_{SD} - Source - Drain Voltage (V)

Capacitance

Frequency=1MHz

Ciss

Coss

Crss

C - Capacitance (pF) vs V_{DS} - Drain-Source Voltage (V)

Gate Charge

$V_{DS} = 50V$
$I_{DS} = 9A$

V_{GS} - Gate-source Voltage (V) vs Q_G - Gate Charge (nC)
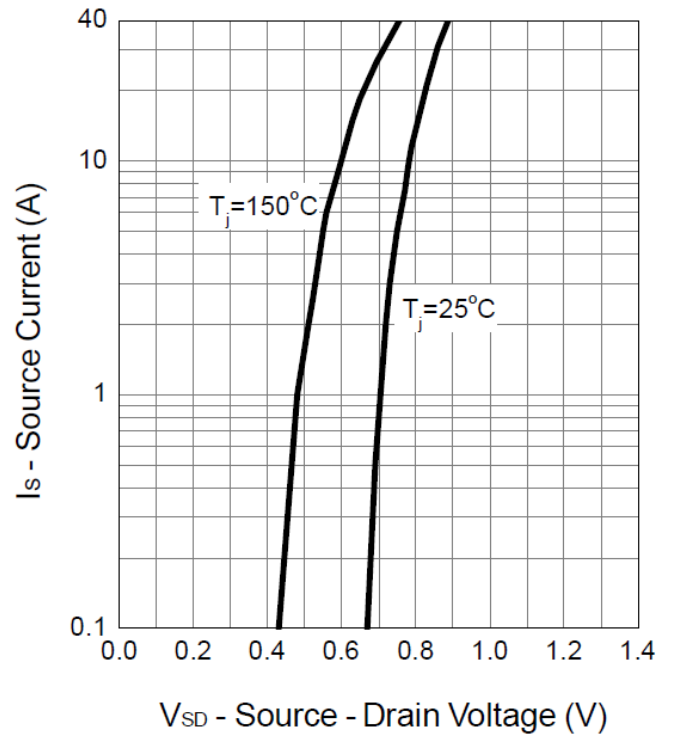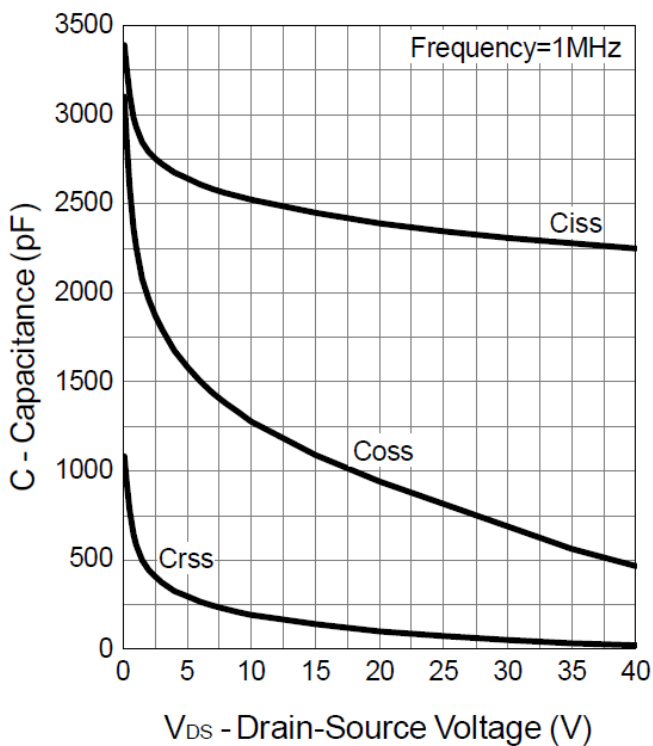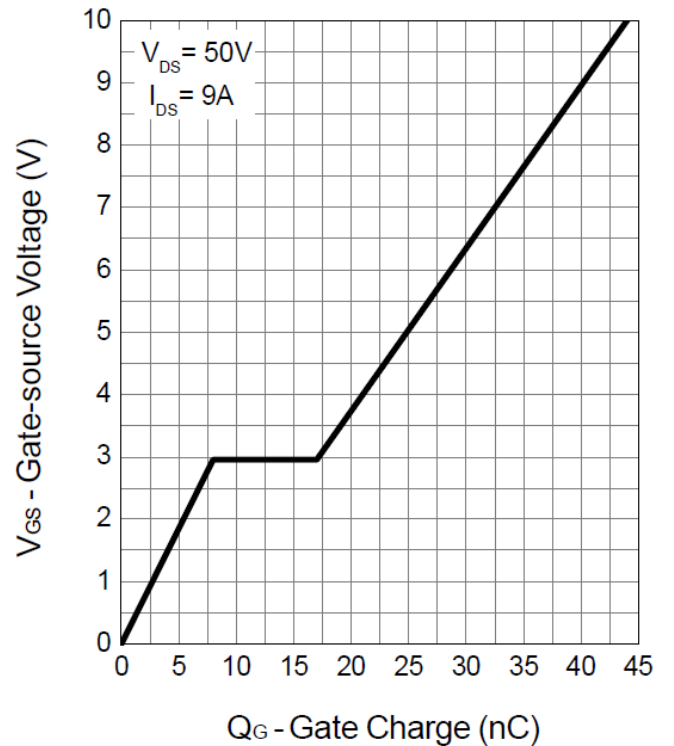
Package Information

SOP-8   Package
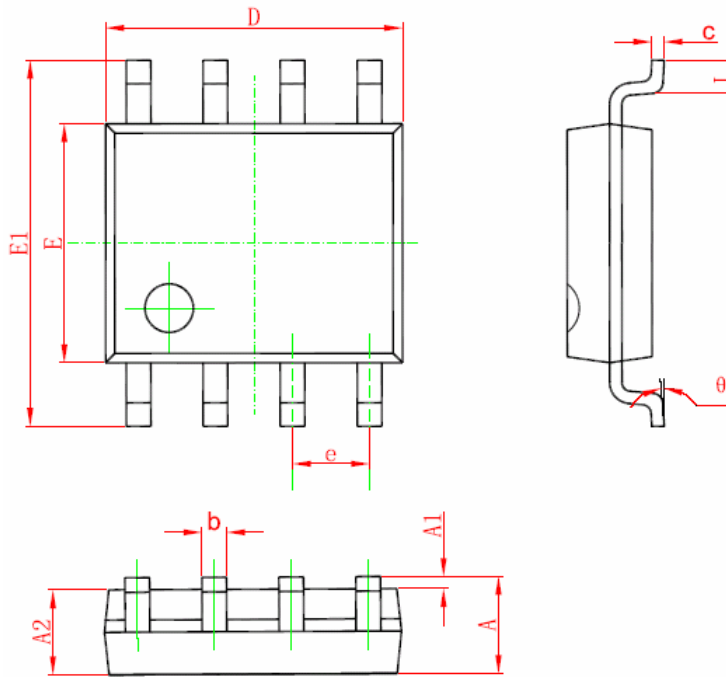
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Design Notes