

N-Channel Enhancement Mode MOSFET

TDM31058

DESCRIPTION

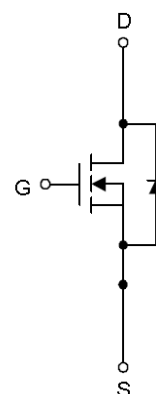
The TDM31058 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

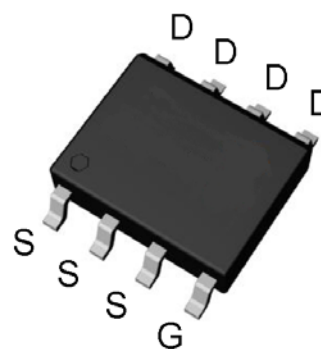
- RDS(ON) < 18.2mΩ @ VGS=4.5V
RDS(ON) < 13.5mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- SOP-8 Package

Application

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



N-Channel MOSFET



Top View of SOP-8

ABSOLUTE MAXIMUM RATINGS(T_A=25°C 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°C)	4	A
Pulsed Drain Current	I _{DM} (T _A =25°C)	32	A
Drain Current @ Continuous	I _D (T _A =25°C)	8.0	A
	I _D (T _A =70°C)	6.5	A
Maximum Power Dissipation(t _≤ 10s)	P _D (T _A =25°C)	3.5	W
	P _D (T _A =70°C)	2.2	W
Thermal Resistance,Junction-to-Ambient (Note 1)	R _{θJA} (t _≤ 10s)	35	°C/W
	R _{θJA} (Steady State)	70	°C/W
Avalanche Current, Single pulse	I _{AS} (L=0.5mH)	18	A
Avalanche Energy, Single pulse	E _{AS} (L=0.5mH)	81	mJ
Maximum Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55 To 150	°C

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

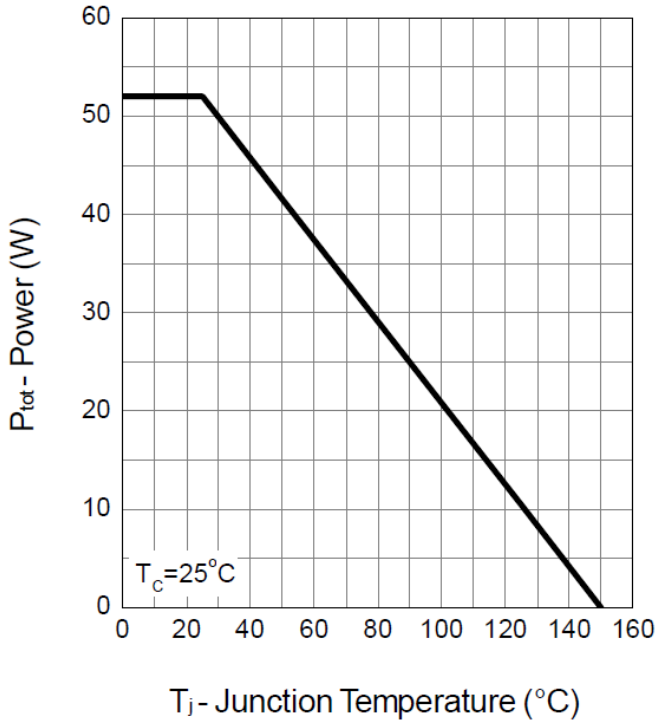
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=80V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	2	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=15A$	-	14	18.2	$m\Omega$
	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	11.2	13.5	$m\Omega$
DYNAMIC CHARACTERISTICS (Note3)						
Gate Resistance	R_G	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	1.0	-	Ω
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, F=1.0MHz$	-	1440	1880	PF
Output Capacitance	C_{oss}		-	405	-	PF
Reverse Transfer Capacitance	C_{rss}		-	30	-	PF
SWITCHING CHARACTERISTICS (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=30V, R_L=30\Omega, V_{GEN}=10V, R_G=6\Omega, I_D=1A$	-	16	29	nS
Turn-on Rise Time	t_r		-	7	13	nS
Turn-Off Delay Time	$t_{d(off)}$		-	38	69	nS
Turn-Off Fall Time	t_f		-	41	74	nS
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=20A, V_{GS}=10V$	-	28	40	nC
Gate-Source Charge	Q_{gs}		-	4.8	-	nC
Gate-Drain Charge	Q_{gd}		-	5.8	-	nC
Body Diode Reverse Recovery Time	T_{rr}	$I_F=20A, di/dt=100A/\mu s$	-	45	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	86	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V_{SD}	$V_{GS}=0V, I_S=2A$	-	0.8	1.3	V

NOTES:

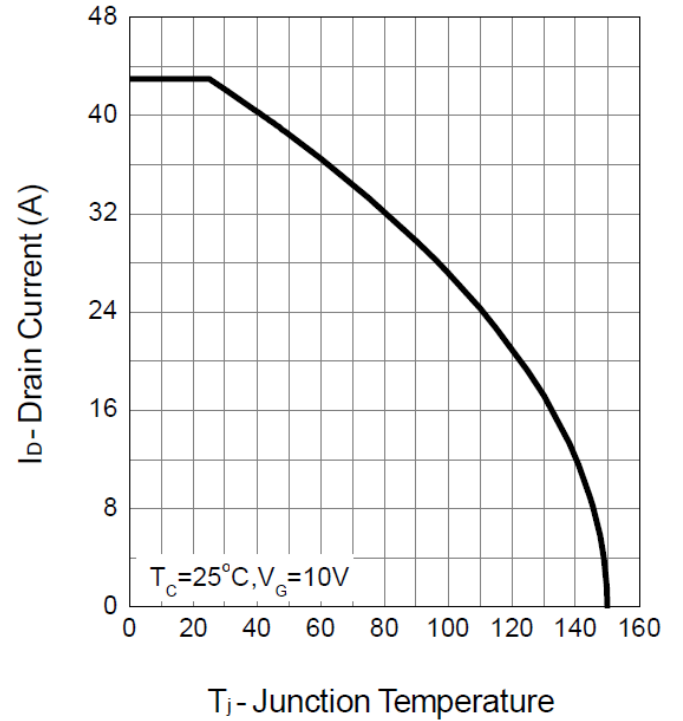
1. Pulse width limited by max. junction temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

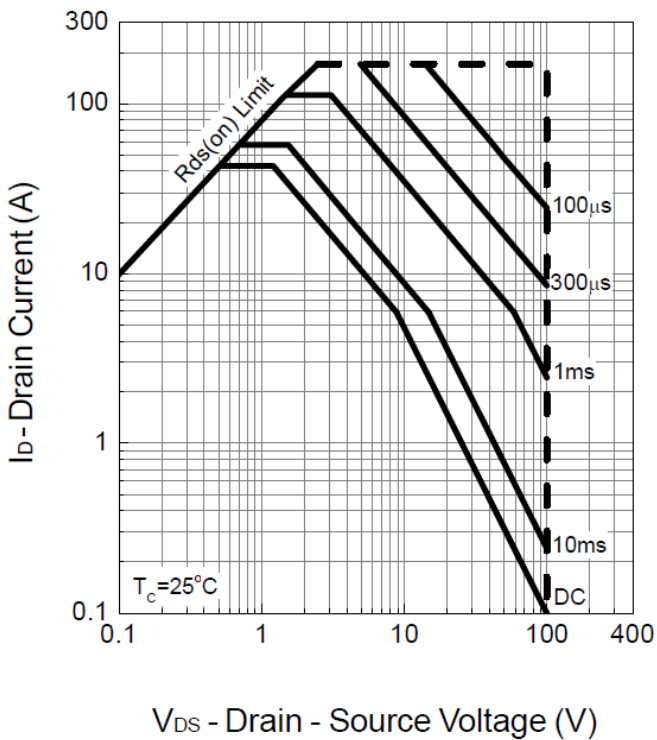
Power Dissipation



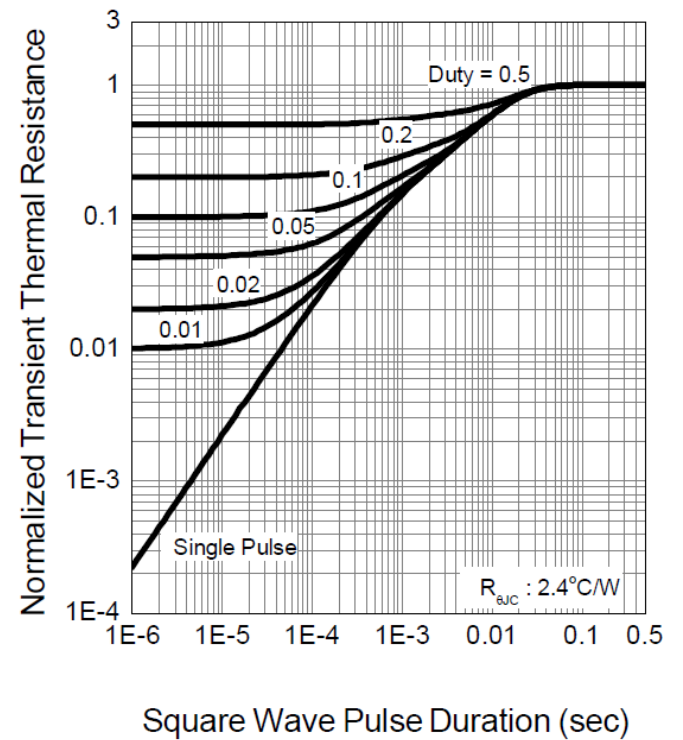
Drain Current



Safe Operation Area

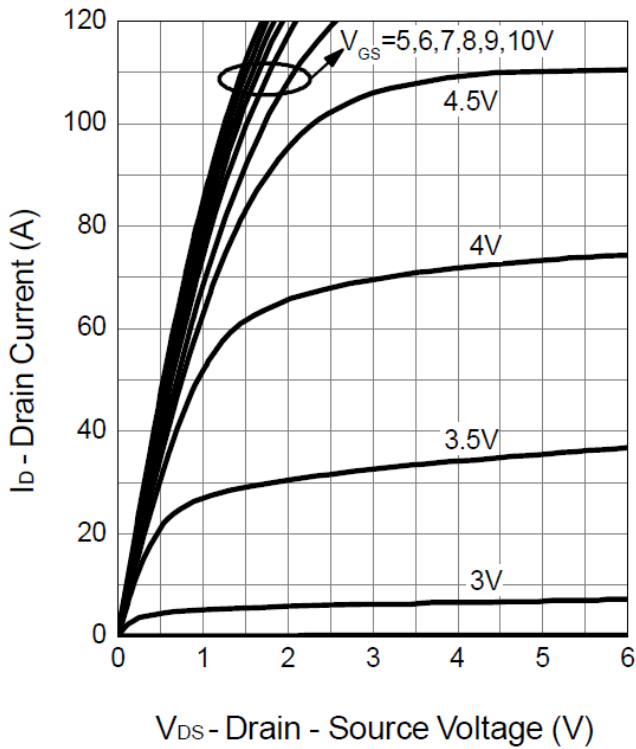


Thermal Transient Impedance

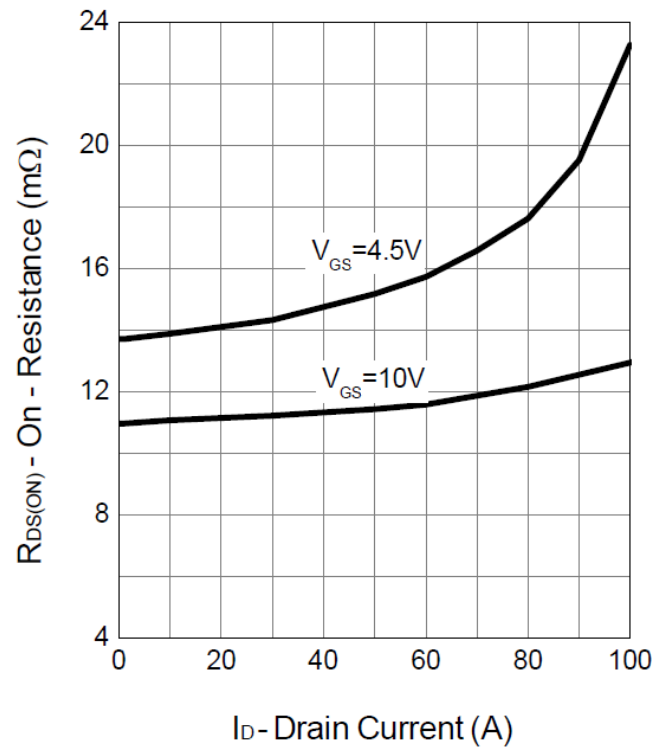


Typical Operating Characteristics (Cont.)

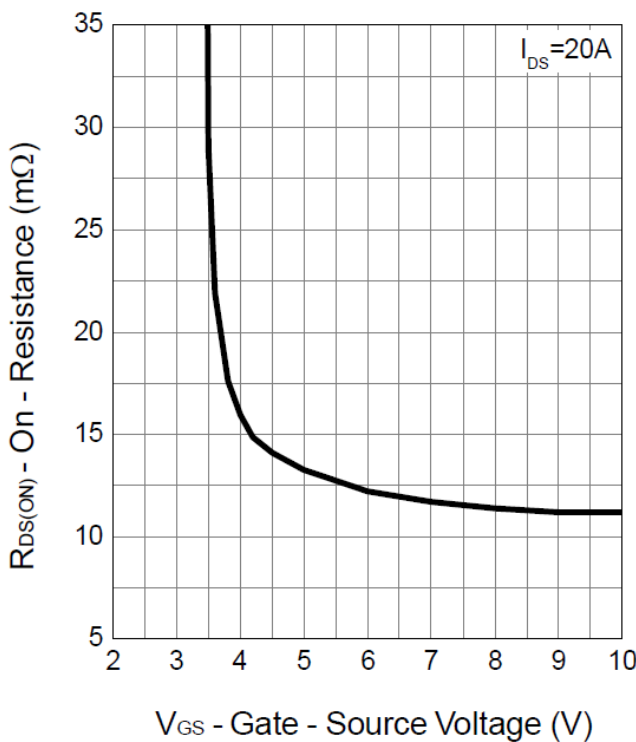
Output Characteristics



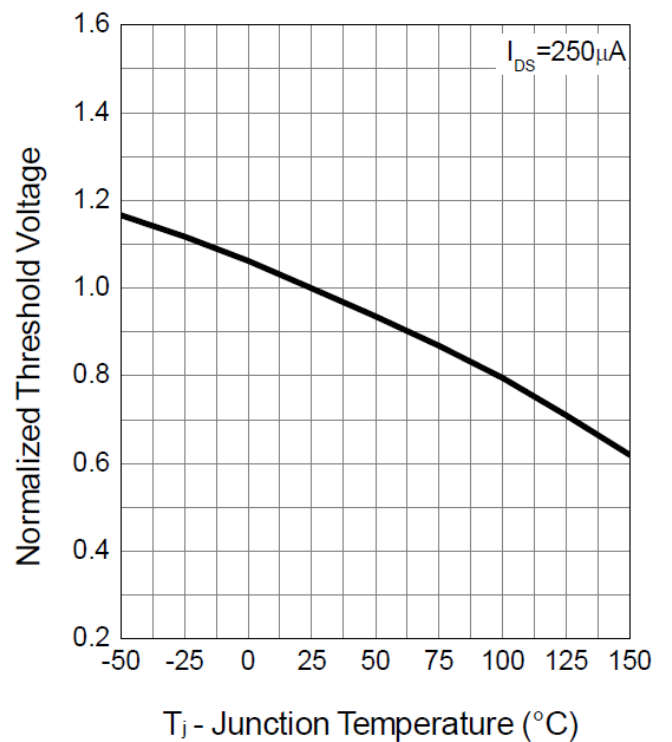
Drain-Source On Resistance



Gate-Source On Resistance

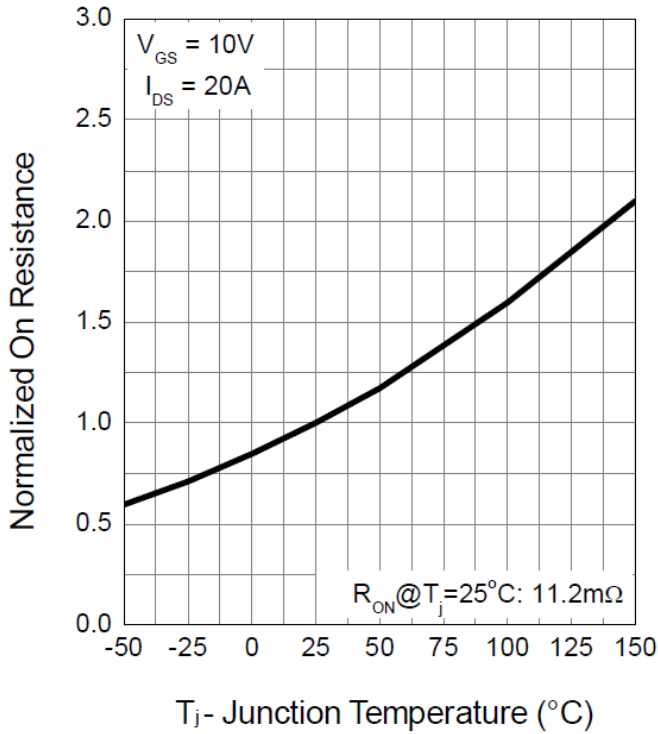


Gate Threshold Voltage

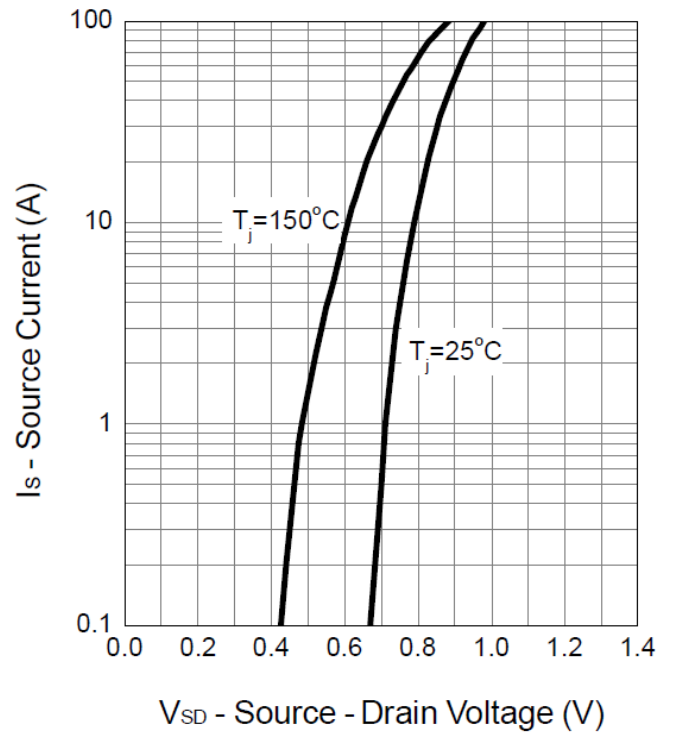


Typical Operating Characteristics (Cont.)

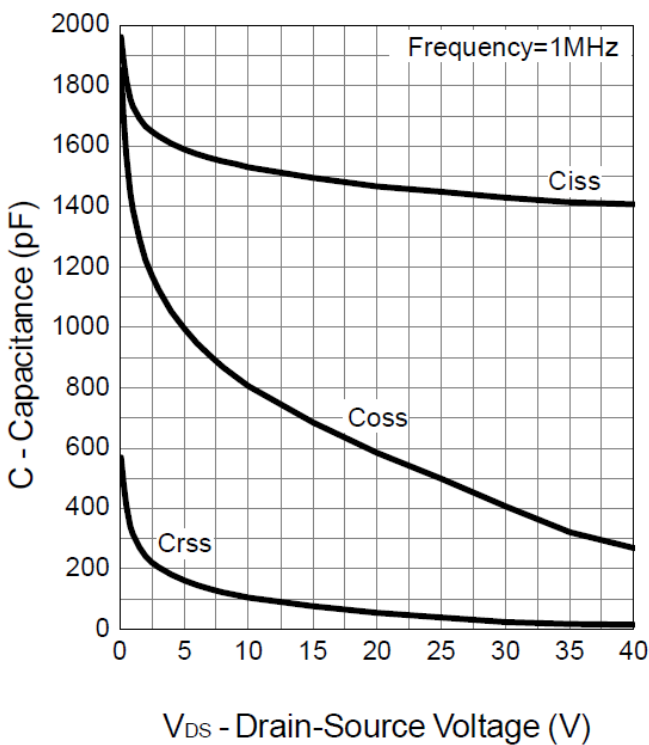
Drain-Source On Resistance



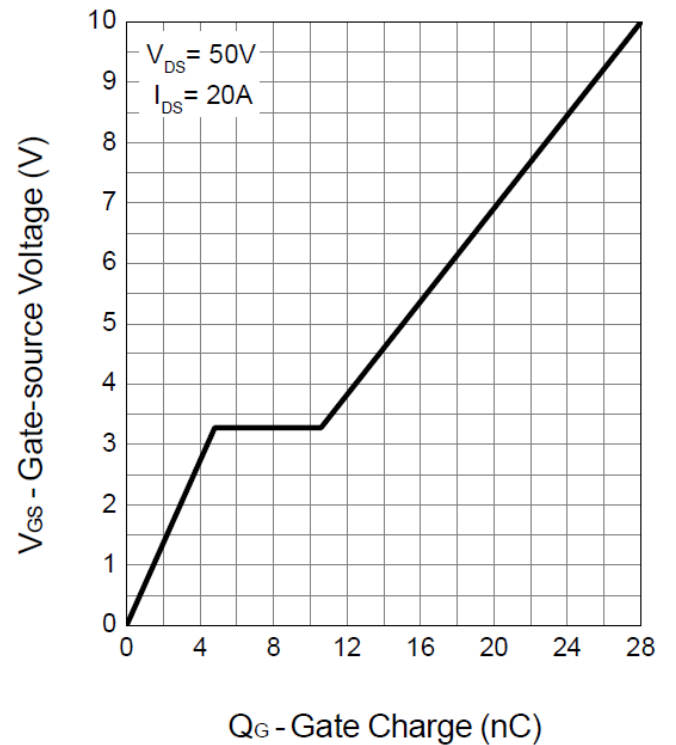
Source-Drain Diode Forward



Capacitance

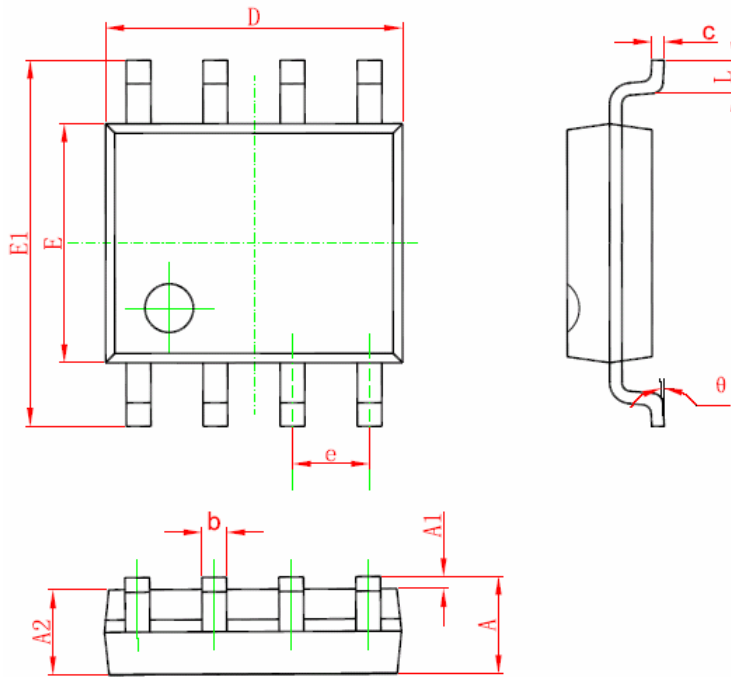


Gate Charge



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