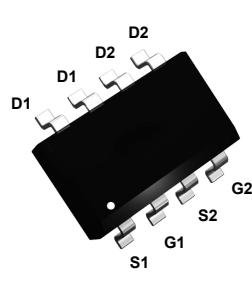
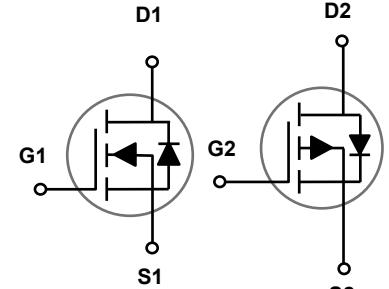


Main Product Characteristics

Polarity	N-Ch	P-Ch
V_{DSS}	60V	-60V
$R_{DS(on)}(Max.)$	30mΩ	48mΩ
I_D	5.9A	-4.7A



SOP-8



Schematic Diagram



Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

Description

The GSFQ6701 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Rating		Unit
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current – Continuous ($T_A=25^\circ C$)	I_D	5.9	-4.7	A
Drain Current – Continuous ($T_A=70^\circ C$)		4.7	-3.8	A
Drain Current – Pulsed ¹	I_{DM}	23.6	-18.8	A
Single Pulse Avalanche Energy ²	E_{AS}	26.4	54.4	mJ
Single Pulse Avalanche Current ²	I_{AS}	23	33	A
Power Dissipation ($T_A=25^\circ C$)	P_D	2.01		W
Power Dissipation – Derate above $25^\circ C$		0.02		W/ $^\circ C$
Storage Temperature Range	T_{STG}	-55 to +150		$^\circ C$
Operating Junction Temperature Range	T_J	-55 to +150		$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction to Case	R_{eJC}	---	38	$^\circ C/W$
Thermal Resistance Junction to Ambient	R_{eJA}	---	62	$^\circ C/W$

N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	60	---	---	V
BV _{DSS} Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to 25°C , $I_{\text{D}}=1\text{mA}$	---	0.07	---	$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	$I_{\text{DS}(\text{SS})}$	$V_{\text{DS}}=60\text{V}, V_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{\text{DS}}=48\text{V}, V_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	---	---	10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$	---	---	± 100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=5\text{A}$	---	25	30	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=3\text{A}$	---	28	36	$\text{m}\Omega$
Gate Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{GS}}=V_{\text{DS}}, I_{\text{D}}=250\mu\text{A}$	1.2	1.6	2.5	V
$V_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta V_{\text{GS}(\text{th})}$		---	-4.6	---	$\text{mV}/^\circ\text{C}$
Forward Transconductance	g_{fs}	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=3\text{A}$	---	10	---	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3, 4}	Q_g	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=10\text{V}, I_{\text{D}}=5\text{A}$	---	16.6	24	nC
Gate-Source Charge ^{3, 4}	Q_{gs}		---	2.2	4.4	
Gate-Drain Charge ^{3, 4}	Q_{gd}		---	3.9	8	
Turn-On Delay Time ^{3, 4}	$T_{\text{d}(\text{on})}$	$V_{\text{DD}}=30\text{V}, V_{\text{GS}}=10\text{V}, R_{\text{G}}=6\Omega, I_{\text{D}}=1\text{A}$	---	4.6	9	nS
Rise Time ^{3, 4}	T_r		---	14.8	28	
Turn-Off Delay Time ^{3, 4}	$T_{\text{d}(\text{off})}$		---	27.2	52	
Fall Time ^{3, 4}	T_f		---	7.8	15	
Input Capacitance	C_{iss}	$V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}, F=1\text{MHz}$	---	1180	1720	pF
Output Capacitance	C_{oss}		---	68	100	
Reverse Transfer Capacitance	C_{rss}		---	45	70	
Gate Resistance	R_g	$V_{\text{GS}}=0\text{V}, V_{\text{DS}}=0\text{V}, F=1\text{MHz}$	---	2.1	4.2	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$V_{\text{G}}=V_{\text{D}}=0\text{V}$, Force Current	---	---	5.9	A
Pulsed Source Current	I_{SM}		---	---	11.8	A
Diode Forward Voltage	V_{SD}	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=1\text{A}, T_J=25^\circ\text{C}$	---	---	1	V

Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{\text{DD}}=25\text{V}, V_{\text{GS}}=10\text{V}, L=0.1\text{mH}$, N-CH $I_{\text{AS}}=23\text{A}$, P-CH $I_{\text{AS}}=33\text{A}$, $R_{\text{G}}=25\Omega$, Starting $T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$\text{V}_{\text{GS}}=0\text{V}, \text{I}_D=-250\mu\text{A}$	-60	---	---	V
BV_{DSS} Temperature Coefficient	$\Delta \text{BV}_{\text{DSS}}/\Delta T_J$	Reference to 25°C , $\text{I}_D=-1\text{mA}$	---	-0.05	---	$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	$\text{I}_{\text{DS}(\text{S})}$	$\text{V}_{\text{DS}}=-60\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=25^\circ\text{C}$	---	---	-1	μA
		$\text{V}_{\text{DS}}=-48\text{V}, \text{V}_{\text{GS}}=0\text{V}, T_J=125^\circ\text{C}$	---	---	-10	μA
Gate-Source Leakage Current	I_{GSS}	$\text{V}_{\text{GS}}=\pm 20\text{V}, \text{V}_{\text{DS}}=0\text{V}$	---	---	± 100	nA
On Characteristics						
Static Drain-Source On-Resistance	$R_{\text{DS}(\text{ON})}$	$\text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-4\text{A}$	---	40	48	$\text{m}\Omega$
		$\text{V}_{\text{GS}}=-4.5\text{V}, \text{I}_D=-3\text{A}$	---	53	68	$\text{m}\Omega$
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	$\text{V}_{\text{GS}}=\text{V}_{\text{DS}}, \text{I}_D = -250\mu\text{A}$	-1.2	-1.6	-2.5	V
$\text{V}_{\text{GS}(\text{th})}$ Temperature Coefficient	$\Delta \text{V}_{\text{GS}(\text{th})}$		---	5	---	$\text{mV}/^\circ\text{C}$
Forward Transconductance	g_{fs}	$\text{V}_{\text{DS}}=-10\text{V}, \text{I}_D=-3\text{A}$	---	10	---	S
Dynamic and Switching Characteristics						
Total Gate Charge ^{3, 4}	Q_g	$\text{V}_{\text{DS}}=-30\text{V}, \text{V}_{\text{GS}}=-10\text{V}, \text{I}_D=-4\text{A}$	---	22.4	31	nC
Gate-Source Charge ^{3, 4}	Q_{gs}		---	4.1	6	
Gate-Drain Charge ^{3, 4}	Q_{gd}		---	5.2	7	
Turn-On Delay Time ^{3, 4}	$T_{\text{d}(\text{on})}$	$\text{V}_{\text{DD}}=-30\text{V}, \text{V}_{\text{GS}}=-10\text{V}, R_{\text{G}}=6\Omega, \text{I}_D=-1\text{A}$	---	13	25	nS
Rise Time ^{3, 4}	T_r		---	42.4	81	
Turn-Off Delay Time ^{3, 4}	$T_{\text{d}(\text{off})}$		---	64.6	123	
Fall Time ^{3, 4}	T_f		---	16.4	31	
Input Capacitance	C_{iss}	$\text{V}_{\text{DS}}=-30\text{V}, \text{V}_{\text{GS}}=0\text{V}, F=1\text{MHz}$	---	1250	1810	pF
Output Capacitance	C_{oss}		---	85	125	
Reverse Transfer Capacitance	C_{rss}		---	65	95	
Gate Resistance	R_g	$\text{V}_{\text{GS}}=0\text{V}, \text{V}_{\text{DS}}=0\text{V}, F=1\text{MHz}$		15	30	Ω
Drain-Source Diode Characteristics and Maximum Ratings						
Continuous Source Current	I_s	$\text{V}_{\text{G}}=\text{V}_{\text{D}}=0\text{V}$, Force Current	---	---	-4.7	A
Pulsed Source Current	I_{SM}		---	---	-9.4	A
Diode Forward Voltage	V_{SD}	$\text{V}_{\text{GS}}=0\text{V}, I_s=-1\text{A}, T_J=25^\circ\text{C}$	---	---	-1	V

Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $\text{V}_{\text{DD}}=25\text{V}, \text{V}_{\text{GS}}=10\text{V}, L=0.1\text{mH}$, N-CH $I_{\text{AS}}=23\text{A}$, P-CH $I_{\text{AS}}=33\text{A}, R_{\text{G}}=25\Omega$, Starting $T_J=25^\circ\text{C}$.
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

N-Channel Typical Electrical and Thermal Characteristic Curves

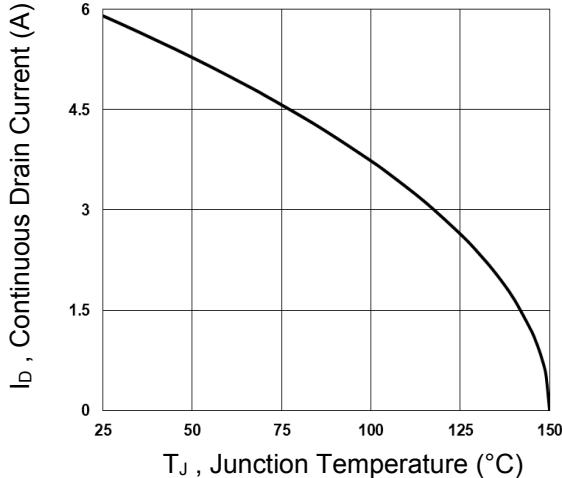


Fig.1 Continuous Drain Current vs. T_c

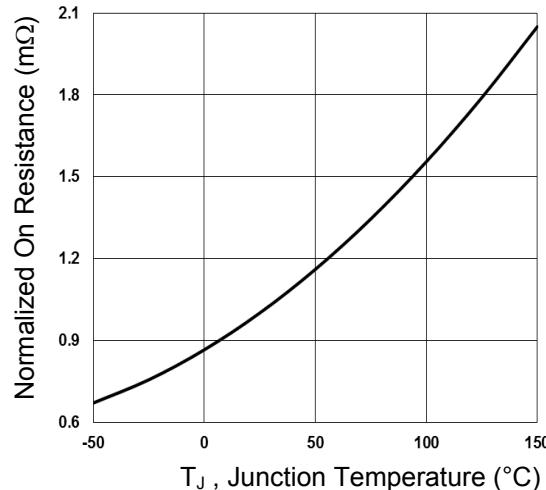


Fig.2 Normalized R_{DS(ON)} vs. T_j

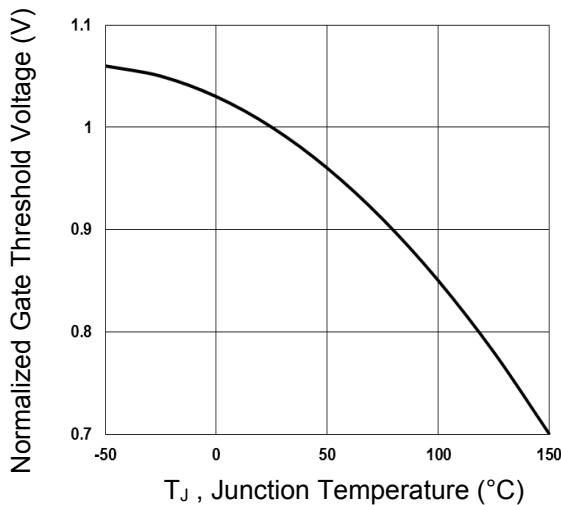


Fig.3 Normalized V_{th} vs. T_j

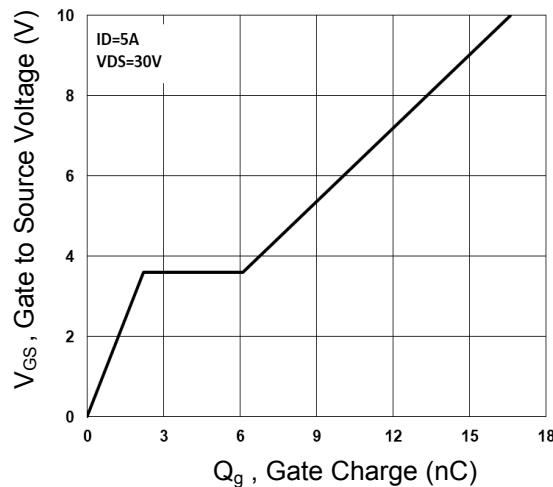


Fig.4 Gate Charge Waveform

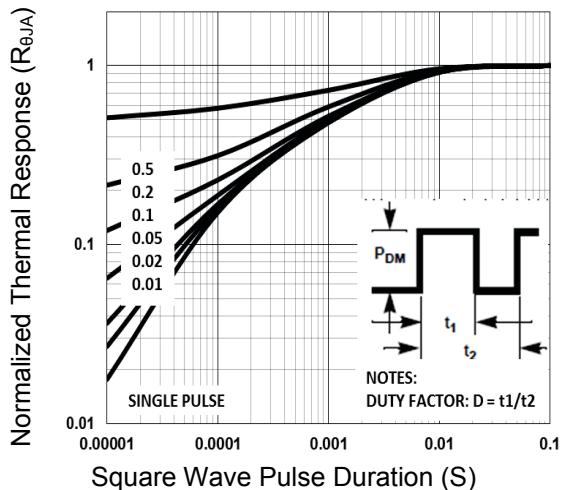


Fig.5 Normalized Transient Impedance

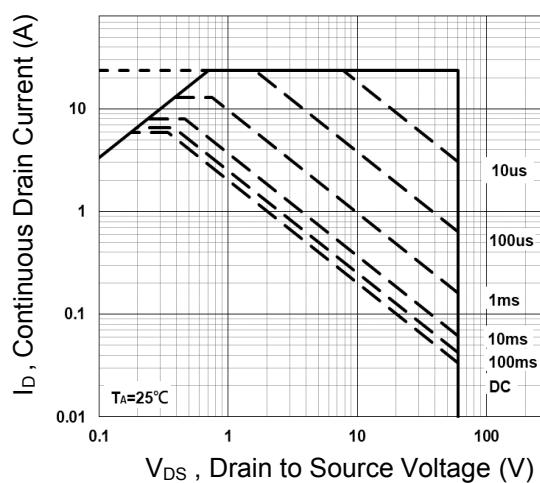


Fig.6 Maximum Safe Operation Area

P-Channel Typical Electrical and Thermal Characteristic Curves

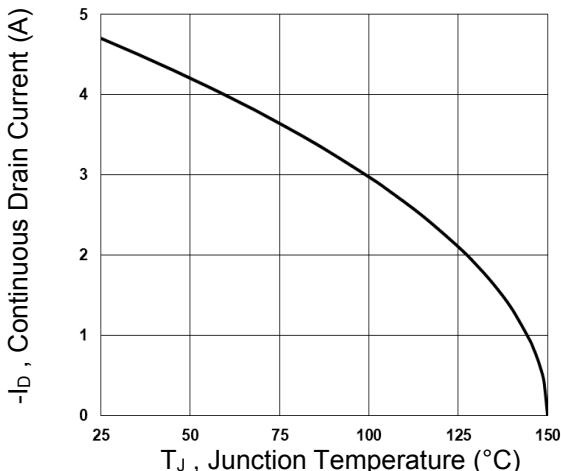


Fig.7 Continuous Drain Current vs. T_J

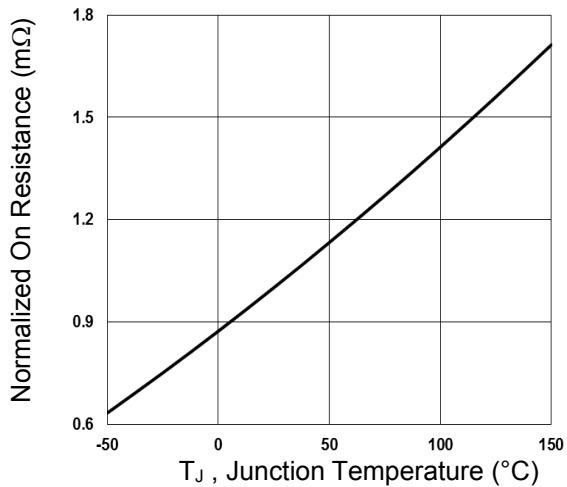


Fig.8 Normalized $R_{DS(ON)}$ vs. T_J

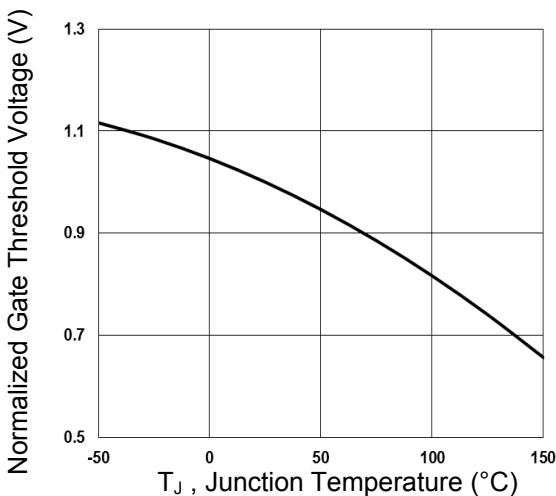


Fig.9 Normalized V_{th} vs. T_J

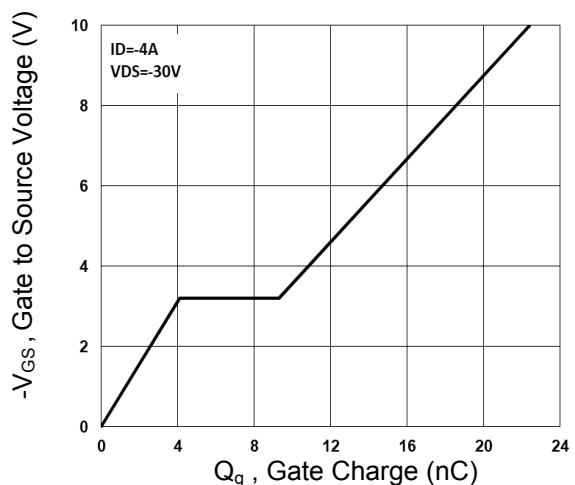


Fig.10 Gate Charge Waveform

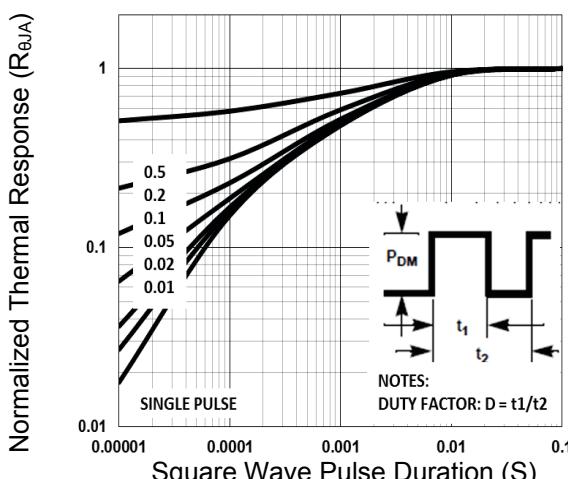


Fig.11 Normalized Transient Impedance

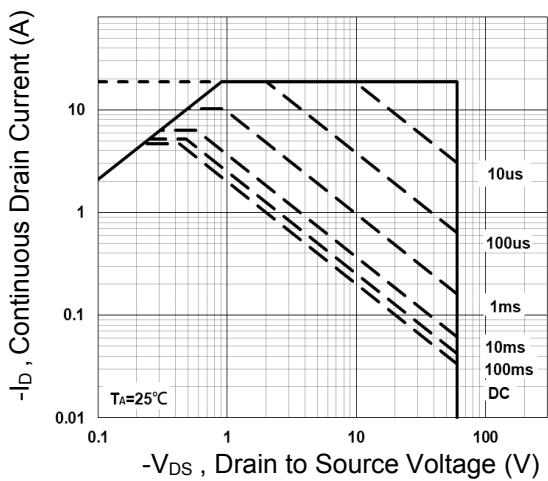
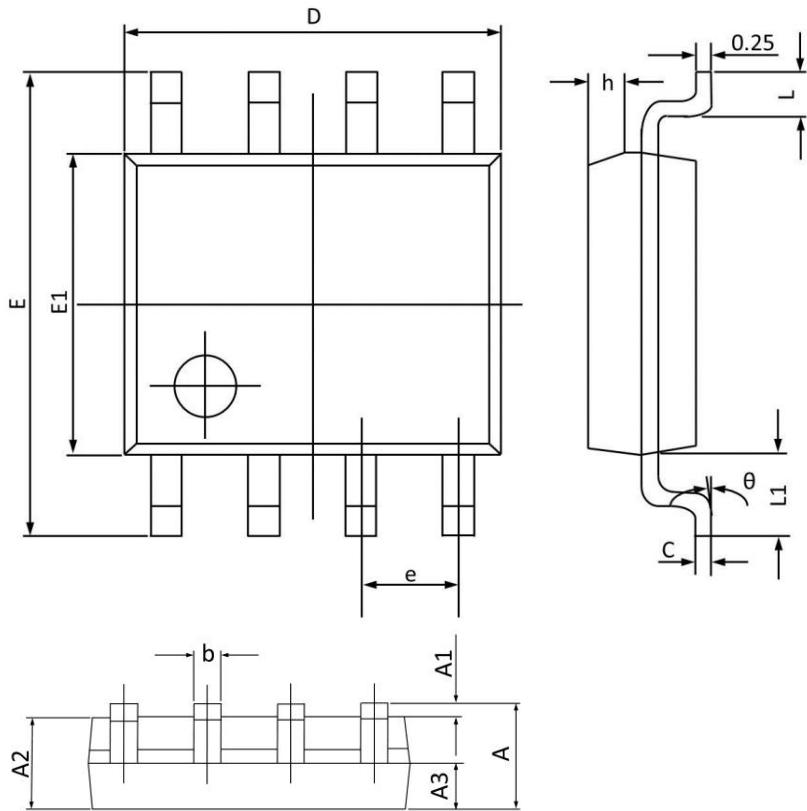


Fig.12 Maximum Safe Operation Area

Package Outline Dimensions

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.068
A1	0.100	0.250	0.004	0.009
A2	1.300	1.500	0.052	0.059
A3	0.600	0.700	0.024	0.027
b	0.390	0.480	0.016	0.018
c	0.210	0.260	0.009	0.010
D	4.700	5.100	0.186	0.200
E	5.800	6.200	0.229	0.244
E1	3.700	4.100	0.146	0.161
e	1.270(BSC)		0.050(BSC)	
h	0.250	0.500	0.010	0.019
L	0.500	0.800	0.019	0.031
L1	1.050(BSC)		0.041(BSC)	
θ	0°	8°	0°	8°