

GSM2093EX6F

20V N and P Channel MOSFETs

Product Description

The enhancement mode power field effect transistor is using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

This device is well suited for high efficiency fast switching applications.

Features

N-Channel

- $R_{DS(ON)}=450m\Omega@V_{GS}=4.5V$
- $R_{DS(ON)}=600m\Omega@V_{GS}=2.5V$
- $R_{DS(ON)}=750m\Omega@V_{GS}=1.8V$

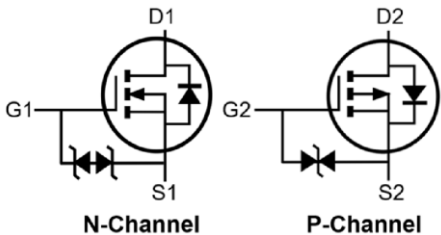
P-Channel

- $R_{DS(ON)}=800m\Omega@V_{GS}=-4.5V$
- $R_{DS(ON)}=1050m\Omega@V_{GS}=-2.5V$
- $R_{DS(ON)}=1500m\Omega@V_{GS}=-1.8V$
- Low-Voltage Operation
- High-Speed Circuits
- SOT-363 Package
- RoHS Compliant and Halogen Free

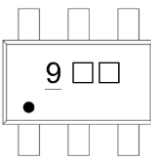
Applications

- Load Switch for Portable Devices
- Power Management Functions

Packages & Pin Assignments

SOT-363			Equivalent Circuit		
 Top View			 N-Channel P-Channel		
Pin	Symbol	Description	Pin	Symbol	Description
1	S1	Source 1	6	D1	Drain 1
2	G1	Gate 1	5	G2	Gate 2
3	D2	Drain 2	4	S2	Source 2

Ordering and Marking Information

Ordering Information			
Part Number	Package	Part Marking	Quantity / Reel
GSM2093EX6F	SOT-363	9□□	3,000 PCS
GSM2093E 1 2 - Product Code: GSM2093E - Package Code: 1 is X6 for SOT-363 - Green Level: 2 is F for RoHS Compliant and Halogen Free			
Marking Information			
 - Product Code: 9 - GS Code: □□			

Absolute Maximum Ratings (T_A=25°C, unless otherwise specified)

Symbol	Parameter		Value		Unit
			N Channel	P Channel	
V _{DSS}	Drain-Source Voltage		20	-20	V
V _{GSS}	Gate-Source Voltage		±10	±8	V
I _D	Continuous Drain Current	T _A =25°C	0.63	-0.47	A
		T _A =70°C	0.5	-0.38	
I _{DM}	Pulsed Drain Current ¹		1.8	-1.4	A
P _D	Power Dissipation	T _A =25°C	0.31		W
		T _A =70°C	0.2		
T _J	Operating Junction Temperature Range		-55 to +150		°C
T _{STG}	Storage Temperature Range		-55 to +150		°C
R _{θJA}	Thermal Resistance, Junction to Ambient ²		400		°C/W

NOTE:

- The power dissipation is limited by 150°C junction temperature.
- The data tested by surface mounted on a 1 inch² FR-4 board with 2oz copper.

Electrical Characteristics (T_A=25°C, unless otherwise specified)

N-Channel

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	20	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	0.3	-	1	V
I _{GSS}	Gate-Source Leakage Current	V _{DS} =0V, V _{GS} =±10V	-	-	±10	uA
I _{DSS}	Drain-Source Leakage Current	V _{DS} =16V, V _{GS} =0V	-	-	1	uA
R _{DS(ON)}	Drain-Source On-Resistance	V _{GS} =4.5V, I _D =0.5A	-	215	450	mΩ
		V _{GS} =2.5V, I _D =0.4A,	-	280	600	
		V _{GS} =1.8V, I _D =0.2A,	-	380	750	
g _{FS}	Forward Transconductance	V _{DS} =10V, I _D =0.4A	-	1.2	-	S
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =0.15A	-	-	1.3	V
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	-	60.7	110	pF
C _{oss}	Output Capacitance		-	10	-	
C _{rss}	Reverse Transfer Capacitance		-	5.37	-	
Q _g	Total Gate Charge	V _{DS} =10V, V _{GS} =4.5V, I _D =0.25A	-	0.74	1.5	nC
Q _{gs}	Gate-Source Charge		-	0.1	-	
Q _{gd}	Gate-Drain Charge		-	0.12	-	
t _{d(on)}	Turn-On Time	V _{DD} =10V, I _D =0.2A, V _{GS} =4.5V, R _G =10Ω	-	5.1	10	ns
t _r	Rise Time		-	7.4	14	
t _{d(off)}	Turn-Off Time		-	27	54	
t _f	Fall Time		-	13	26	

Electrical Characteristics (T_A=25°C, unless otherwise specified)

P-Channel

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-20	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.3	-	-1	V
I _{GSS}	Gate-Source Leakage Current	V _{DS} =0V, V _{GS} =±8V	-	-	±10	μA
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-16V, V _{GS} =0V	-	-	-1	μA
R _{DS(ON)}	Drain-Source On-Resistance	V _{GS} =-4.5V, I _D =-0.5A	-	580	800	mΩ
		V _{GS} =-2.5V, I _D =-0.2A,	-	810	1050	
		V _{GS} =-1.8V, I _D =-0.1A,	-	1050	1500	
g _{FS}	Forward Transconductance	V _{DS} =-10V, I _D =-0.4A	-	1.1	-	S
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _S =-0.15A	-	-	-1.3	V
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-16V, V _{GS} =0V, f=1MHz	-	59.8	110	pF
C _{oss}	Output Capacitance		-	12.1	-	
C _{rss}	Reverse Transfer Capacitance		-	6.4	-	
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-0.25A	-	0.63	1.2	nC
Q _{gs}	Gate-Source Charge		-	0.11	-	
Q _{gd}	Gate-Drain Charge		-	0.13	-	
t _{d(on)}	Turn-On Time	V _{DD} =-10V, I _D =-0.2A, V _{GS} =-4.5V, R _G =10Ω	-	5.1	10	ns
t _r	Rise Time		-	8.1	16	
t _{d(off)}	Turn-Off Time		-	29	58	
t _f	Fall Time		-	21	42	

Typical Performance Characteristics (N Channel)

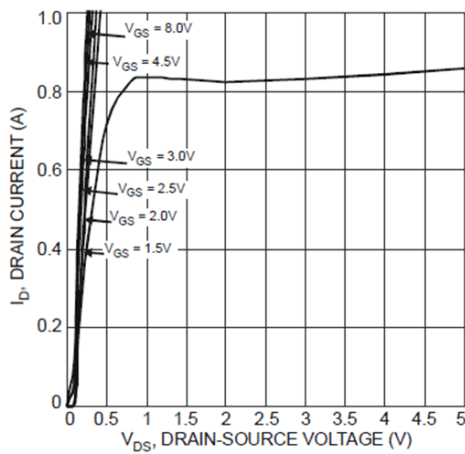


Fig. 1 Typical Output Characteristics

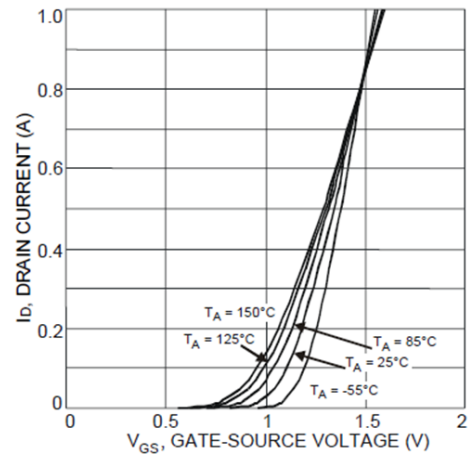


Fig. 2 Typical Transfer Characteristics

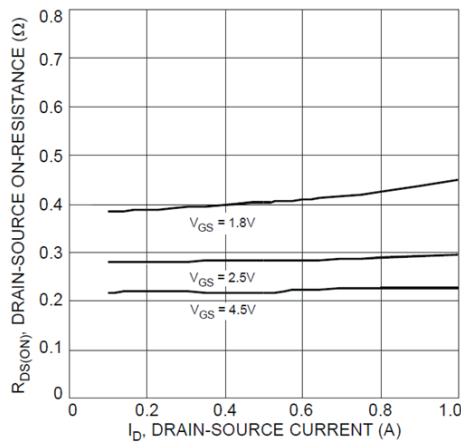


Fig. 3 Typical $R_{DS(ON)}$ vs. I_D

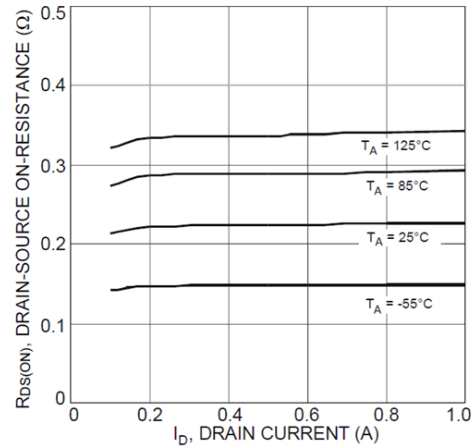


Fig. 4 Typical $R_{DS(ON)}$ vs. I_D

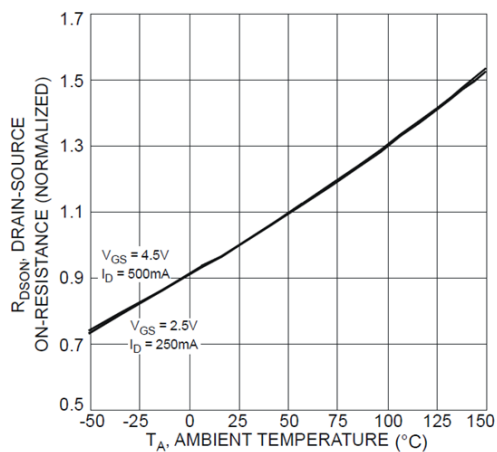


Fig. 5 $R_{DS(ON)}$ vs. Temp

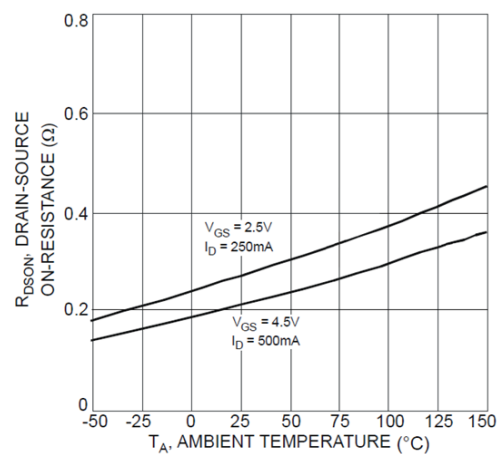


Fig. 6 $R_{DS(ON)}$ vs. Temp

Typical Performance Characteristics (N Channel)

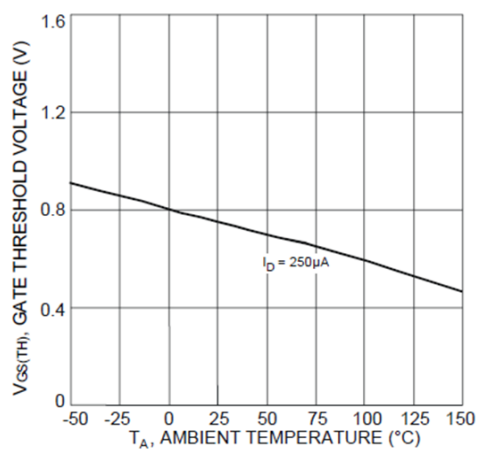


Fig. 7 $V_{GS(th)}$ vs. Temp

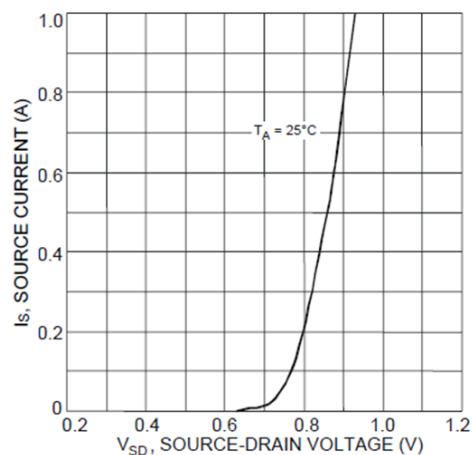


Fig. 8 Diode Characteristics

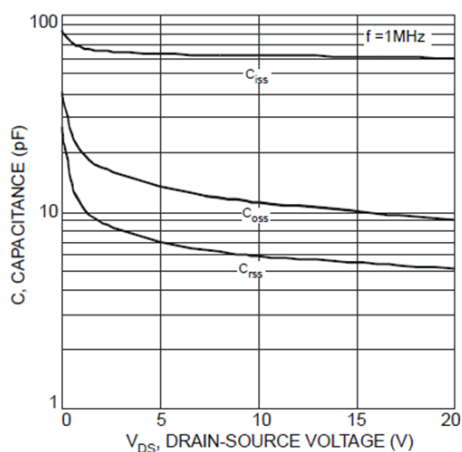


Fig. 9 Capacitance Characteristics

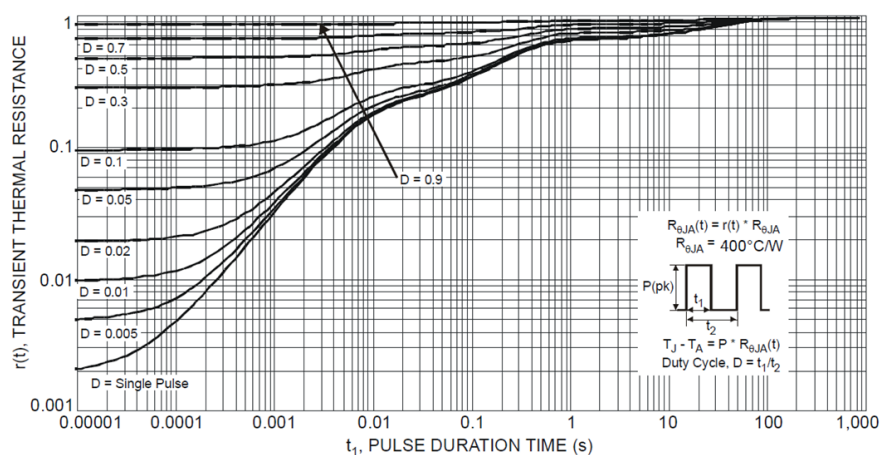


Fig. 10 Normalized Transient Thermal Impedance

Typical Performance Characteristics (P Channel)

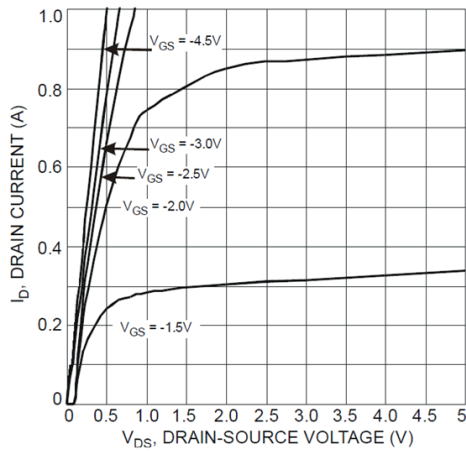


Fig. 11 Typical Output Characteristics

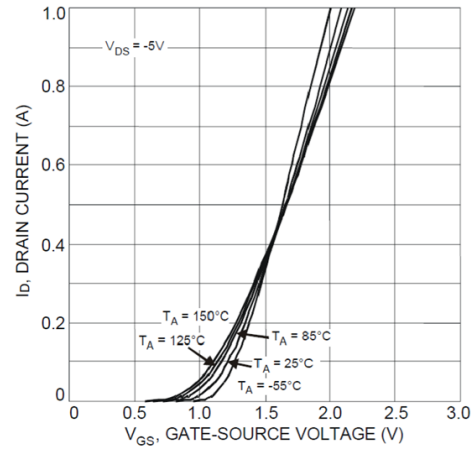


Fig. 12 Typical Transfer Characteristics

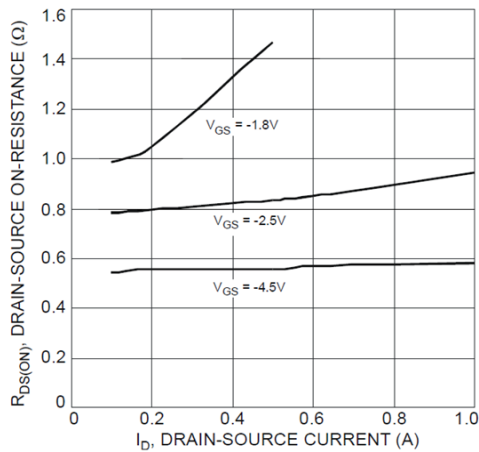


Fig. 13 Typical $R_{DS(ON)}$ vs. I_D

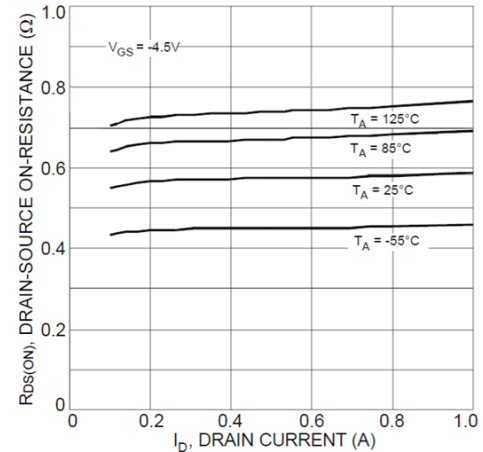


Fig. 14 Typical $R_{DS(ON)}$ vs. I_D

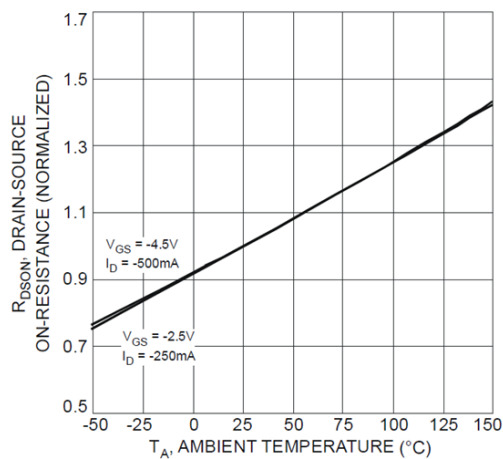


Fig. 15 $R_{DS(ON)}$ vs. Temp

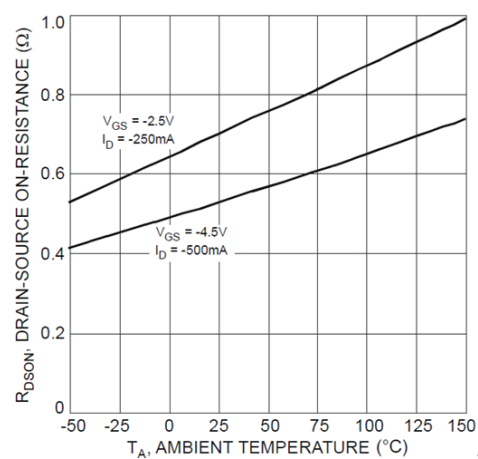


Fig. 16 $R_{DS(ON)}$ vs. Temp

Typical Performance Characteristics (P Channel)

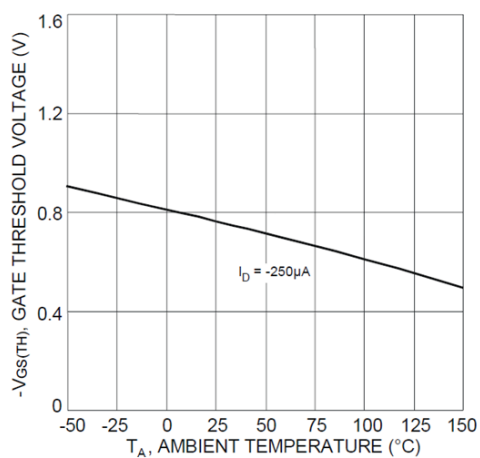


Fig. 17 $V_{GS(th)}$ vs. Temp

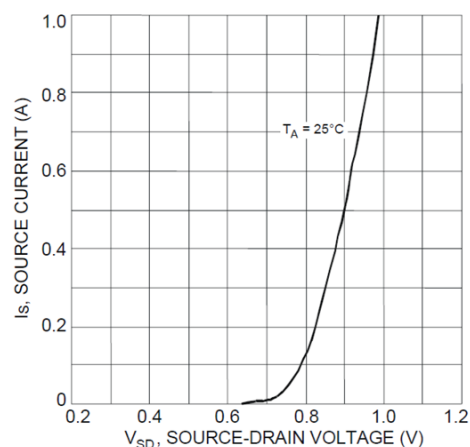


Fig. 18 Diode Characteristics

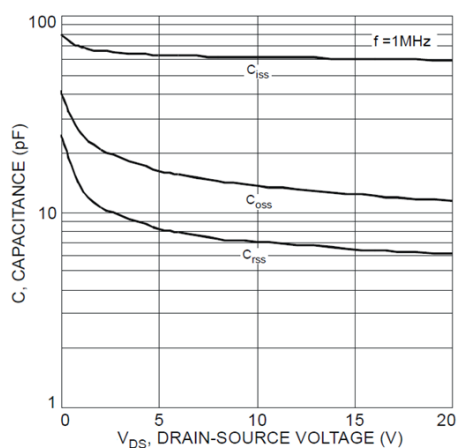


Fig. 19 Capacitance Characteristics

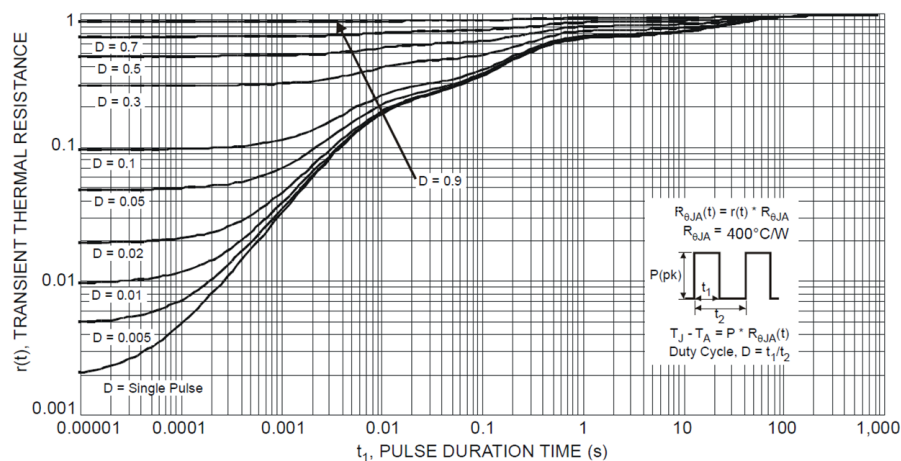
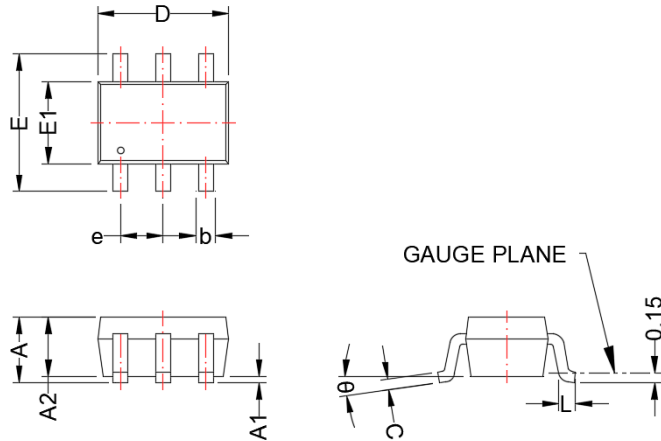


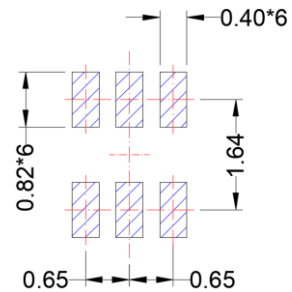
Fig. 20 Normalized Transient Thermal Impedance

SOT-363

Package Dimension



Recommended Land Pattern



Unit:mm

Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.80	1.10	0.031	0.043
A1	0.00	0.10	0.000	0.004
A2	0.70	1.00	0.028	0.039
b	0.15	0.30	0.006	0.012
c	0.08	0.25	0.003	0.010
D	1.80	2.20	0.071	0.087
E	1.80	2.40	0.071	0.094
E1	1.15	1.35	0.045	0.053
e	0.65 BSC		0.026 BSC	
L	0.26	0.46	0.010	0.018
θ	0°	8°	0°	8°

NOTE:

Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

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