GSM2093EX6F

N & P Pair Enhancement Mode MOSFET

Product Description

The GSM2093E is the N and P Pair enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent $R_{DS(ON)}$, low gate charge.

These devices are particularly suited for low voltage power management, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

Features

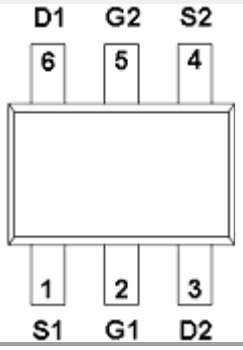
- N-Channel
  20V/0.5A, $R_{DS(ON)}$=450mΩ@V_{GS}=4.5V
  20V/0.4A, $R_{DS(ON)}$=600mΩ@V_{GS}=2.5V
  20V/0.2A, $R_{DS(ON)}$=750mΩ@V_{GS}=1.8V
- P-Channel
  -20V/-0.5A, $R_{DS(ON)}$= 800mΩ@V_{GS}=-4.5V
  -20V/-0.2A, $R_{DS(ON)}$= 1050mΩ@V_{GS}=-2.5V
  -20V/-0.1A, $R_{DS(ON)}$= 1500mΩ@V_{GS}=-1.8V
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation
- SOT-363 package design

Applications

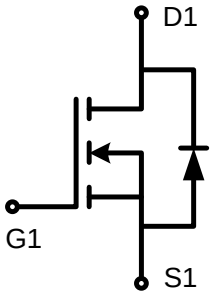
- Load Switch for Portable Devices, Smart Phones, Pagers.

Packages & Pin Assignments

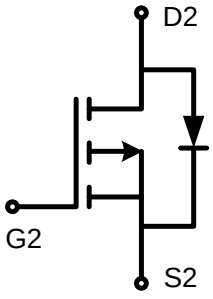
GSM2093EX6F(SOT-363)



1	Source 1
2	Gate 1
3	Drain 2
4	Source 2
5	Gate 2
6	Drain 1

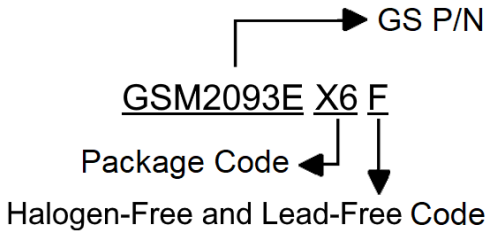


n-channel

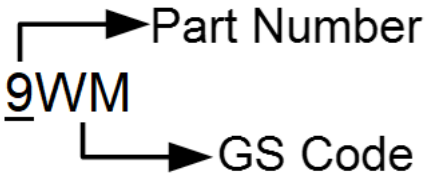


p-channel

Ordering Information



Marking Information



Part Number	Package	Part Marking
GSM2093EX6F	SOT-363	9WM

/

Absolute Maximum Ratings

T_A=25ºC unless otherwise noted

Symbol	Parameter		Typical		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_J=150ºC)	T_A =25ºC	0.63	-0.47	A
		T_A =70ºC	0.5	-0.38	
I_{DM}	Pulsed Drain Current		1.8	-1.4	A
P_D	Power Dissipation	T_A =25ºC	0.31		W
		T_A =70ºC	0.2		
T_J	Operating Junction Temperature		-55/150		ºC
T_{STG}	Storage Temperature Range		-55/150		ºC
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient[1]		400		℃/W

Note1. Device mounted on FR-4 substrate PC board.

Electrical Characteristics

T_A=25ºC unless otherwise noted

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static							
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	N-Ch	20			V
		V_{GS}=0V, I_D=-250uA	P-Ch	-20			
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	N-Ch	0.3		1.0	
		V_{DS}=V_{GS}, I_D=-250uA	P-Ch	-0.3		-1.0	
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±10V	N-Ch			±10	uA
		V_{DS}=0V, V_{GS}=±8V	P-Ch			±10	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V	N-Ch			1	uA
		V_{DS}=-16V, V_{GS}=0V	P-Ch			-1	
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=4.5V, I_D=0.5A	N-Ch		215	450	mΩ
		V_{GS}=-4.5V, I_D=-0.5A	P-Ch		580	800	
		V_{GS}=2.5V, I_D=0.4A	N-Ch		280	600	
		V_{GS}=-2.5V, I_D=-0.2A	P-Ch		810	1050	
		V_{GS}=1.8V, I_D=0.2A	N-Ch		380	750	
		V_{GS}=-1.8V, I_D=-0.1A	P-Ch		1050	1500	
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=0.4A	N-Ch		1.2		S
		V_{DS}=-10V, I_D=-0.4A	P-Ch		1.1		
V_{SD}	Diode Forward Voltage	I_S=0.15A, V_{GS}=0V	N-Ch			1.3	V
		I_S=-0.15A, V_{GS}=0V	P-Ch			-1.3	
Dynamic							
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1MHz	N-Ch		60.7		pF
		V_{DS}=-16V, V_{GS}=0V, f=1MHz	P-Ch		59.8		
C_{oss}	Output Capacitance	V_{DS}=10V, V_{GS}=0V, f=1MHz	N-Ch		10		
		V_{DS}=-16V, V_{GS}=0V, f=1MHz	P-Ch		12.1		
C_{rss}	Reverse Transfer Capacitance	V_{DS}=10V, V_{GS}=0V, f=1MHz	N-Ch		5.37		
		V_{DS}=-16V, V_{GS}=0V, f=1MHz	P-Ch		6.4		
Q_g	Total Gate Charge	N-Channel V_{DS}=10V, V_{GS}=4.5V, I_D=0.25A P-Channel V_{DS}=-10V, V_{GS}=-4.5V, I_D=-0.25A	N-Ch		0.74		nC
			P-Ch		0.63		
Q_{gs}	Gate-Source Charge		N-Ch		0.1		
			P-Ch		0.11		
Q_{gd}	Gate-Drain Charge		N-Ch		0.12		
			P-Ch		0.13		

Electrical Characteristics (Continue)

T_A=25ºC unless otherwise noted

$t_{d(on)}$	Turn-On Time	N-Channel V_{DD}=10V, R_L=47Ω, I_D=0.2A V_{GEN}=4.5V, R_G=10Ω	N-Ch		5.1		ns
			P-Ch		5.1		
t_r			N-Ch		7.4		
			P-Ch		8.1		
$t_{d(off)}$	Turn-Off Time	P-Channel V_{DD}=-10V, R_L=47Ω, I_D=-0.2A V_{GEN}=-4.5V, R_G=10Ω	N-Ch		27		
			P-Ch		29		
t_f			N-Ch		13		
			P-Ch		21		

Typical Performance Characteristics (N-Channel)

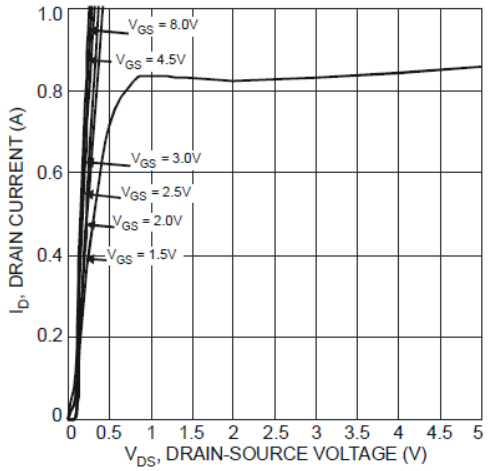


Fig. 1 Typical Output Characteristics

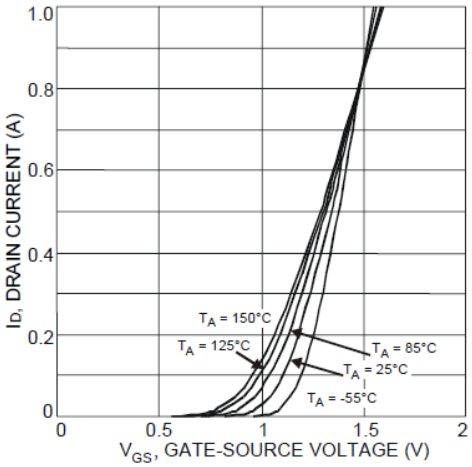


Fig. 2 Typical Transfer Characteristics

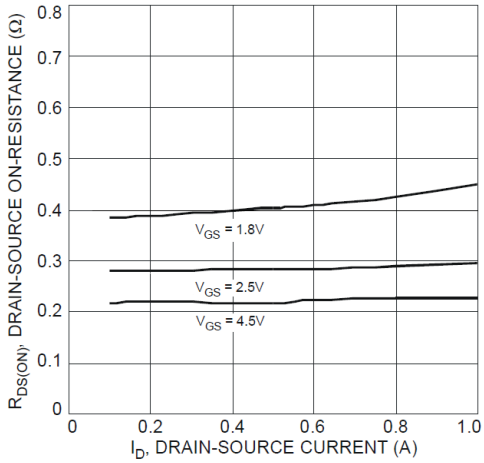


Fig. 3 Typical On-Resistance vs. I_D and V_{GS}

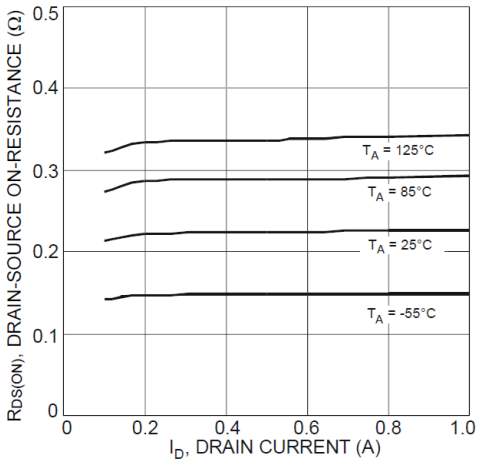


Fig. 4 Typical Drain-Source On-Resistance vs. I_D and T_J

Typical Performance Characteristics **(N-Channel)**

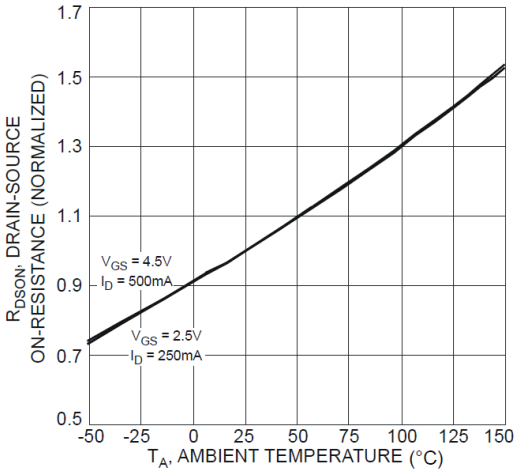


Fig. 5 On-Resistance Variation with T_A

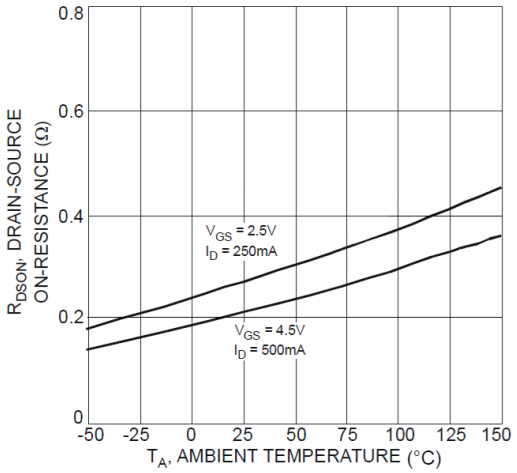


Fig. 6 On-Resistance Variation with T_A

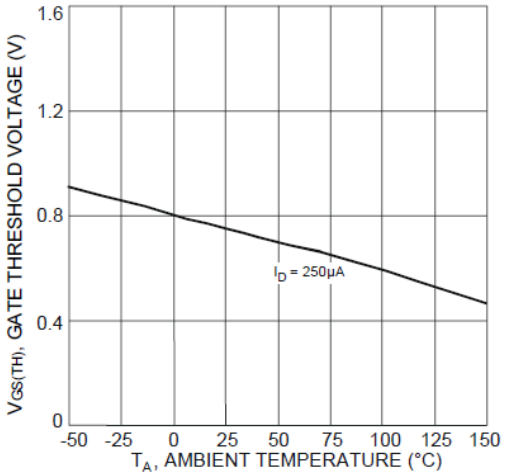


Fig. 7 Gate Threshold Variation vs. T_A

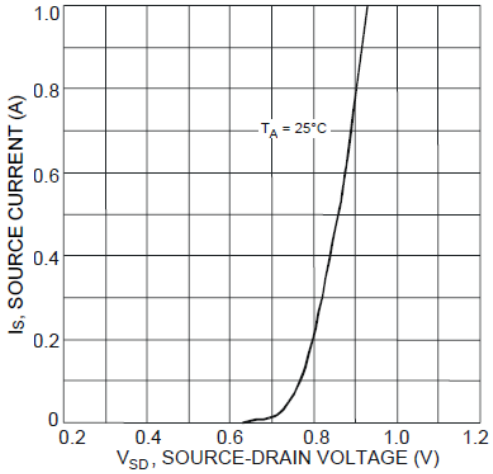


Fig. 8 Diode Forward Voltage vs. Current

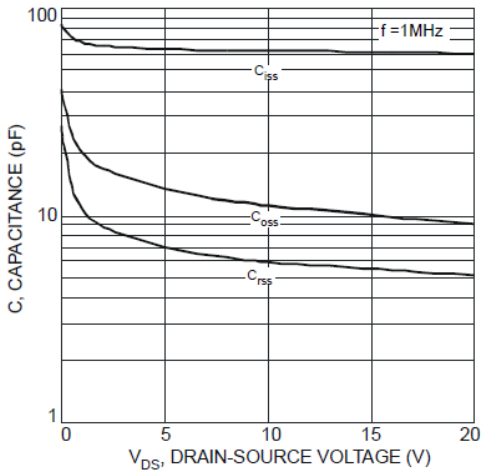


Fig. 9 Typical Capacitance

Typical Performance Characteristics **(N-Channel)**

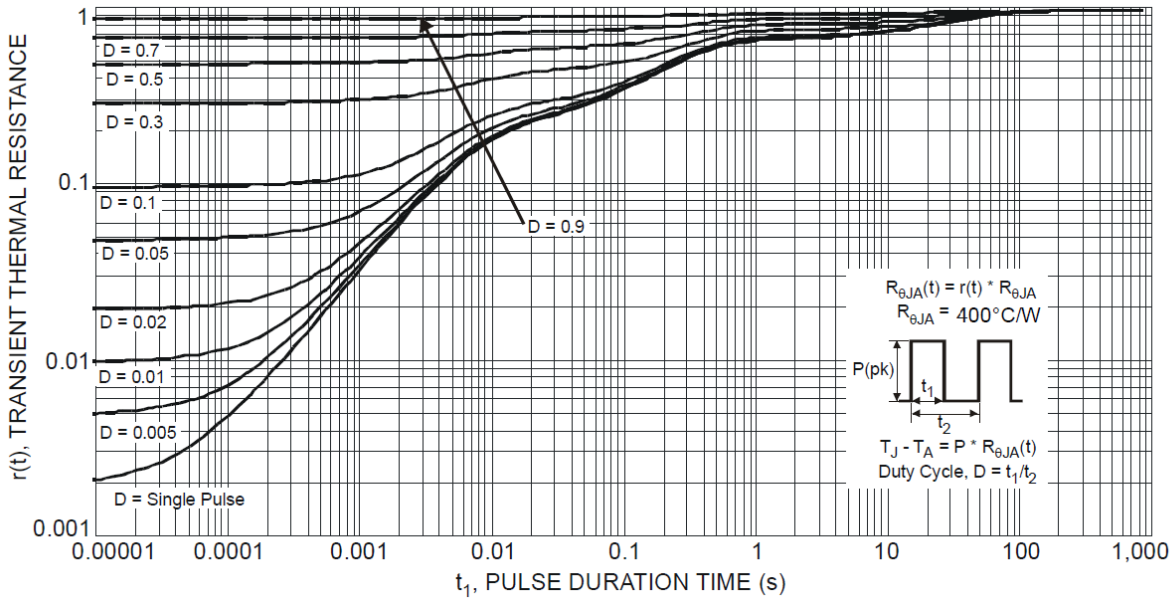


Fig. 10 Transient Thermal Response

Typical Performance Characteristics (P-Channel)

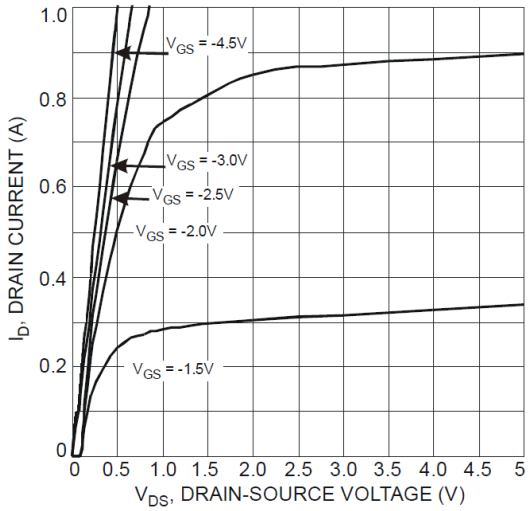


Fig. 1 Typical Output Characteristics

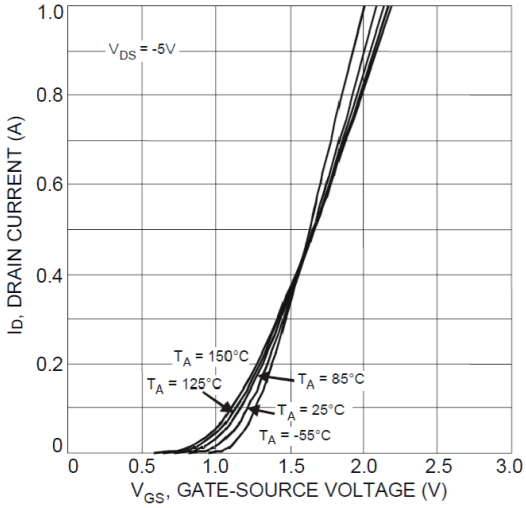


Fig. 2 Typical Transfer Characteristics

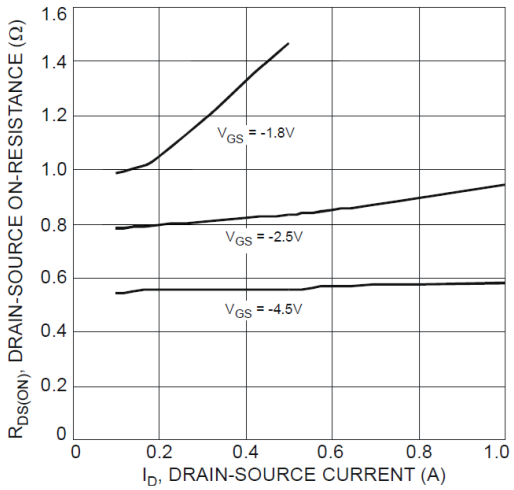


Fig. 3 Typical On-Resistance vs. I_D and V_{GS}

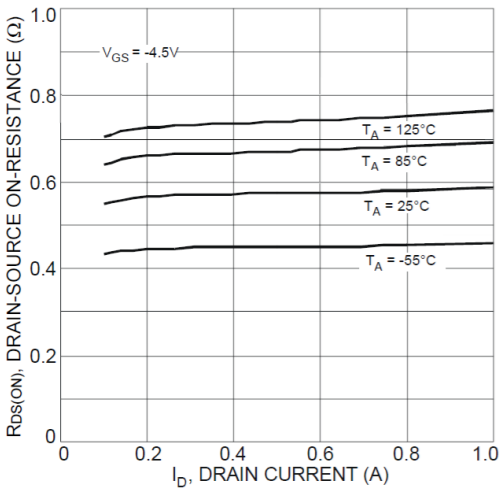


Fig. 4 Typical Drain-Source On-Resistance vs. I_D and T_A

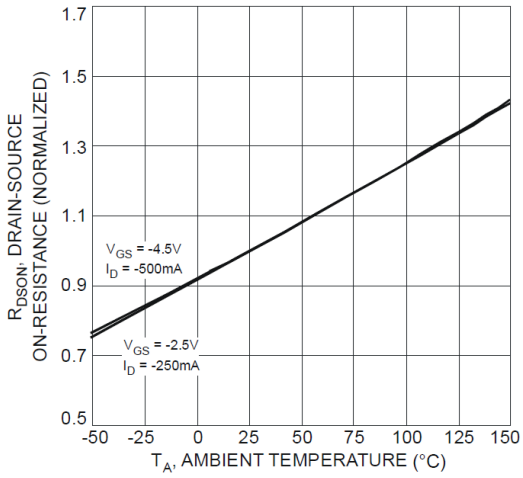


Fig. 5 On-Resistance Variation with T_J

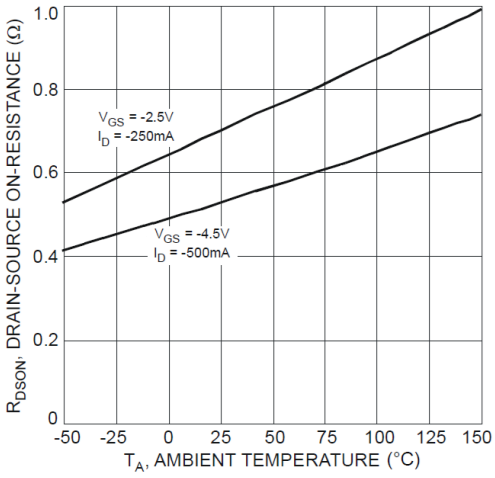


Fig. 6 On-Resistance Variation with T_J

Typical Performance Characteristics (P-Channel)

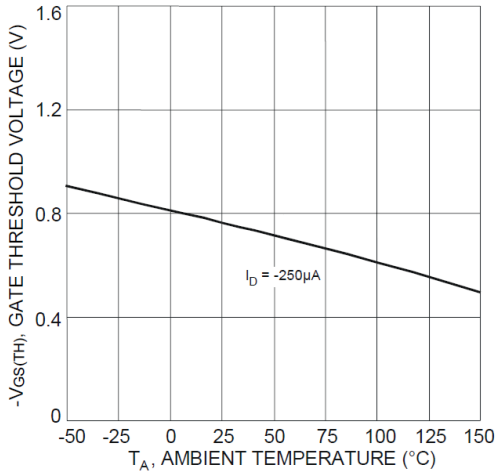


Fig. 7 Gate Threshold Variation vs. T_A

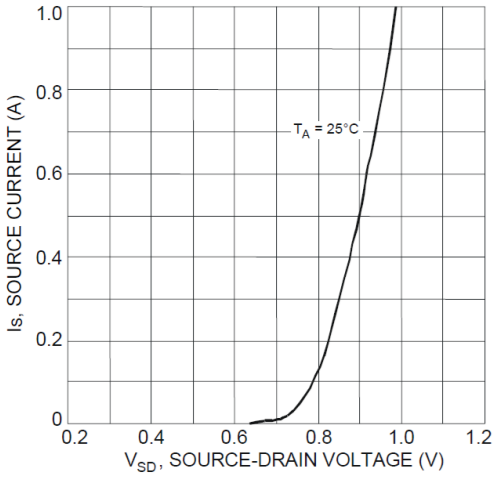


Fig. 8 Diode Forward Voltage vs. Current

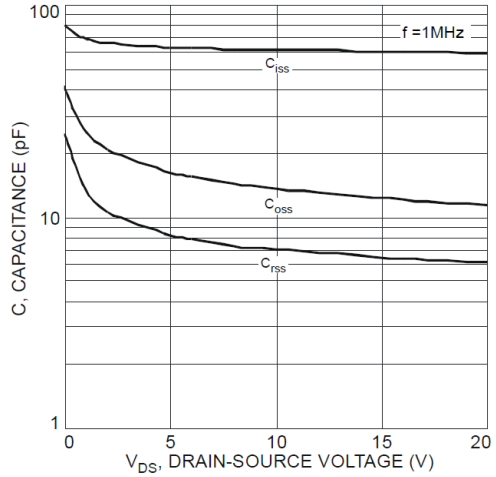


Fig. 9 Typical Capacitance

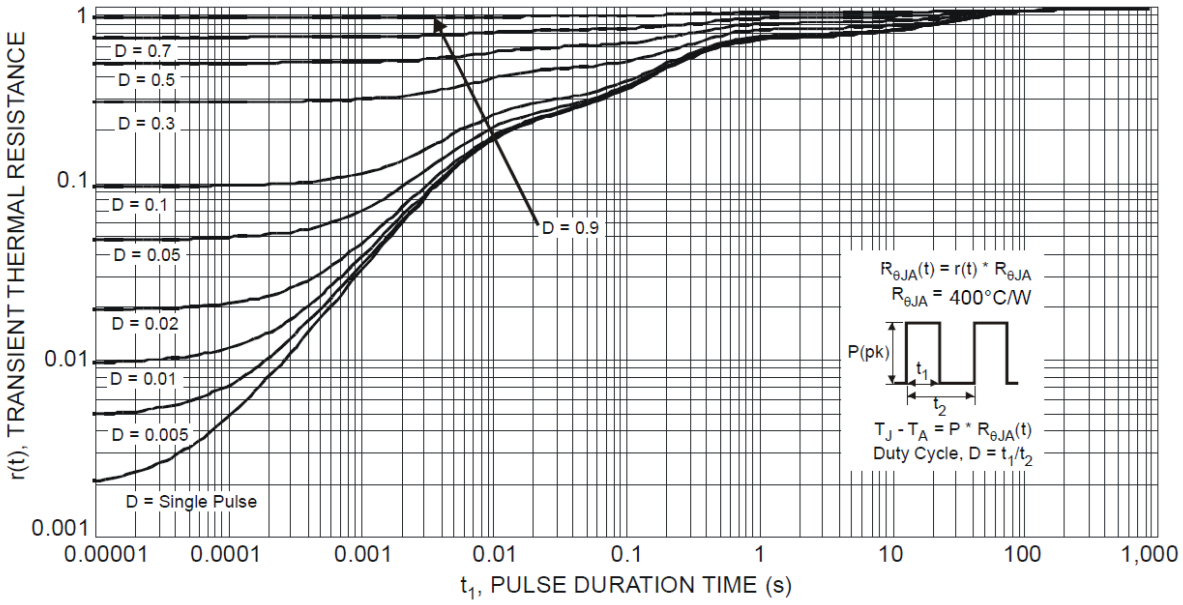
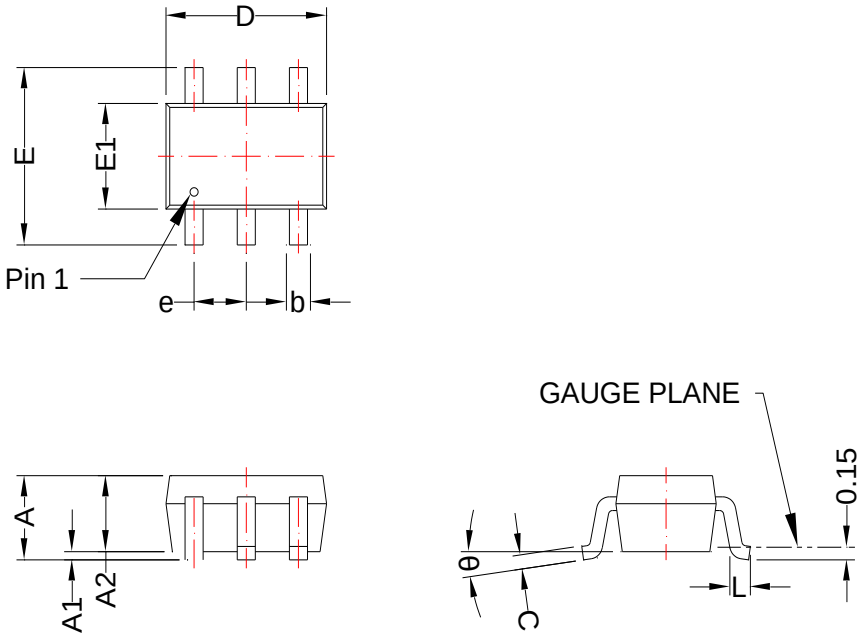


Fig. 10 Transient Thermal Response

Package Dimension

SOT-363



THE D DIMENSION DOES NOT INCLUDE MOLD FLASH,PROTRUSIONS OR GATE BURRS,MOLD FLASH,PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.2mm END. THE E1 DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION,INTERLEAD FLASH OR PROTRUSION SHALL NOT 0.20mm PER SIDE.

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	0.45	0.010	0.018
θ	0º	8 º	0º	8 º

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