优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D max T_A = +25°C
30V	28mΩ @ V_{GS} = 10V	5.8A
	42mΩ @ V_{GS} = 4.5V	4.8A
	82mΩ @ V_{GS} = 3V	2.0A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

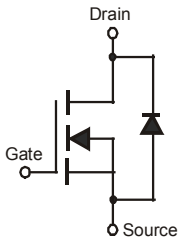
Applications

- Battery Charging
- Power Management Functions
- DC-DC Converters
- Portable Power Adaptors

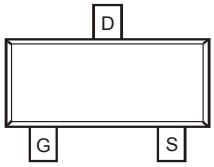
Mechanical Data

- Case: SOT23 (Standard)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (approximate)

Top View



Internal Schematic



Top View

Maximum Ratings (@ T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage (Notes 6, 7)			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = -40°C T_A = +25°C T_A = +85°C	I_D	4.6 4.2 3.0	A
Continuous Drain Current (Note 7) V_{GS} = 10V	Steady State	T_A = -40°C T_A = +25°C T_A = +85°C	I_D	6.2 5.8 4.0	A
Continuous Drain Current (Note 7) V_{GS} = 4.5V	Steady State	T_A = -40°C T_A = +25°C T_A = +85°C	I_D	5.2 4.8 3.2	A
Continuous Drain Current (Note 7) V_{GS} = 3V	Steady State	T_A = -40°C T_A = +25°C T_A = +85°C	I_D	2.2 2.0 1.0	A
Pulsed Drain Current			I_{DM}	30	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P_D	0.72	W
Thermal Resistance, Junction to Ambient @T_A = +25°C	$R_{\theta JA}$	173	°C/W
Power Dissipation (Note 7)	P_D	1.4	W
Thermal Resistance, Junction to Ambient @T_A = +25°C	$R_{\theta JA}$	90	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1.0	1.5	2.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance T_J = -40°C (Note 9)	$R_{DS(on)}$	—	23	27	—	V_{GS} = 4.5V, I_D = 4.8A
		—	57	74	—	V_{GS}=3V, I_D =2A
Static Drain-Source On-Resistance T_J = +25°C	$R_{DS(on)}$	—	24	28	mΩ	V_{GS} = 10V, I_D = 5.8A
		—	33	42		V_{GS} = 4.5V, I_D = 4.8A
		—	63	82		V_{GS}=3V, I_D =2A
Static Drain-Source On-Resistance T_J = +85°C (Note 9)	$R_{DS(on)}$	—	71	95	mΩ	V_{GS}=3V, I_D =2A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	10	—	S	V_{DS} = 5V, I_D = 5.8A
Diode Forward Voltage	V_{SD}	—	0.75	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	498	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	52	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	45	—	pF	
Gate Resistance	R_g	—	1.75	2.8	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 3V)	Q_g	—	3.8	5.3	nC	V_{GS} = 3V, V_{DS} = 15V, I_D = 1A
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	5.3	7.5	nC	V_{GS} = 10V/4.5V, V_{DS} = 15V, I_D = 5.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	11.3	16	nC	
Gate-Source Charge	Q_{gs}	—	1.4	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.1	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	3.41	10	ns	V_{DD} = 15V, V_{GS} = 10V, R_L = 2.6Ω, R_G = 3Ω
Turn-On Rise Time	t_r	—	6.18	13	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	13.92	28	ns	
Turn-Off Fall Time	t_f	—	2.84	10	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design and 25°C data. Not subject to production testing
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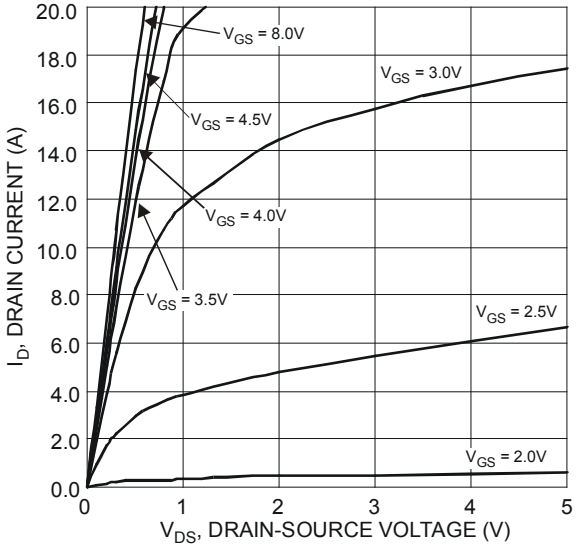


Figure 1 Typical Output Characteristics

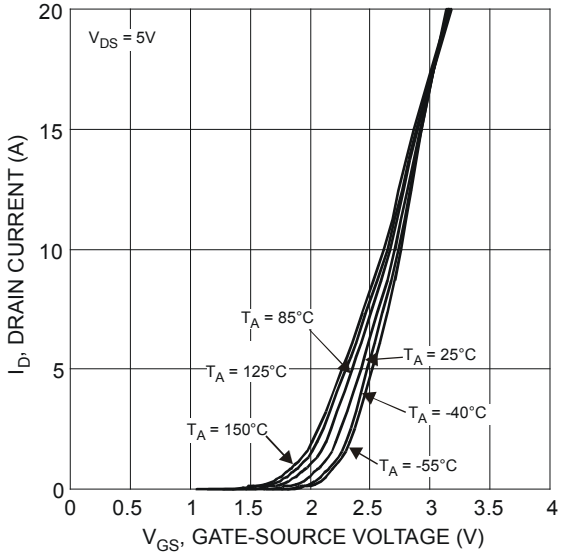


Figure 2 Typical Transfer Characteristics

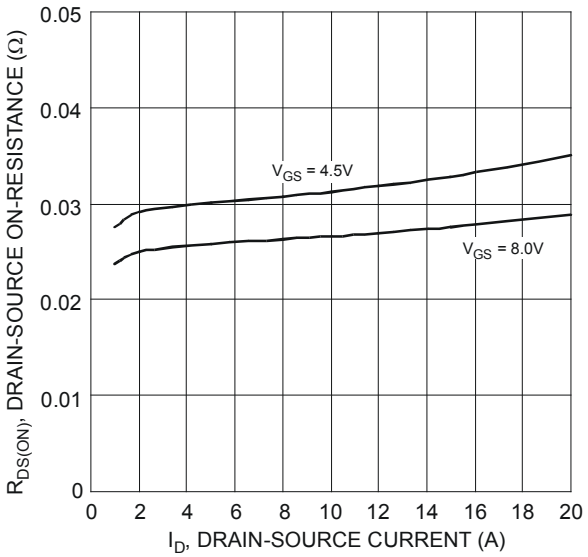


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

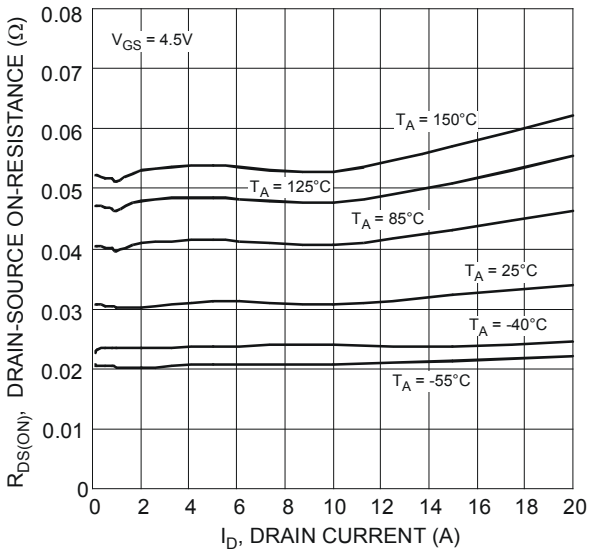


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

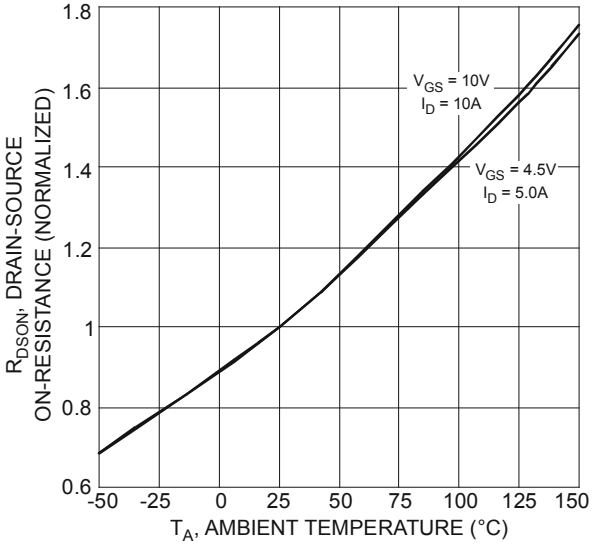


Figure 5 On-Resistance Variation with Temperature

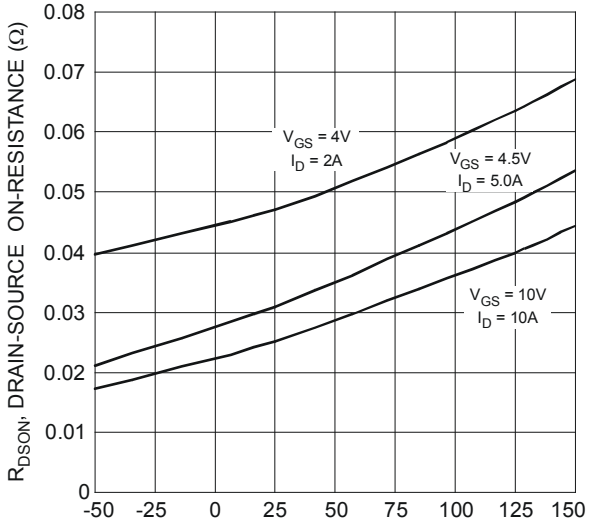


Figure 6 On-Resistance Variation with Temperature

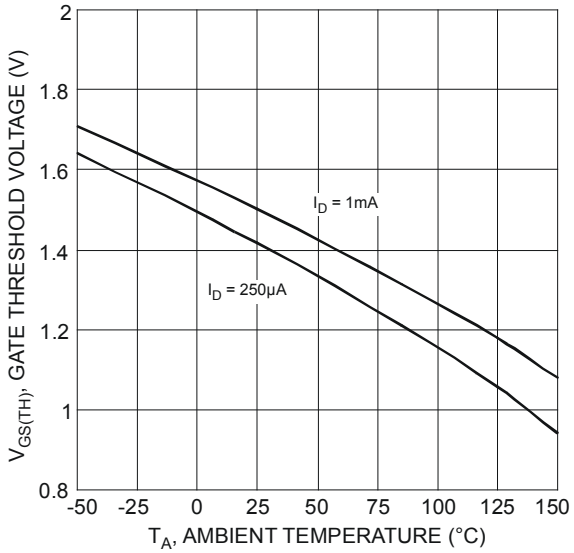


Figure 7 Gate Threshold Variation vs. Ambient Temperature

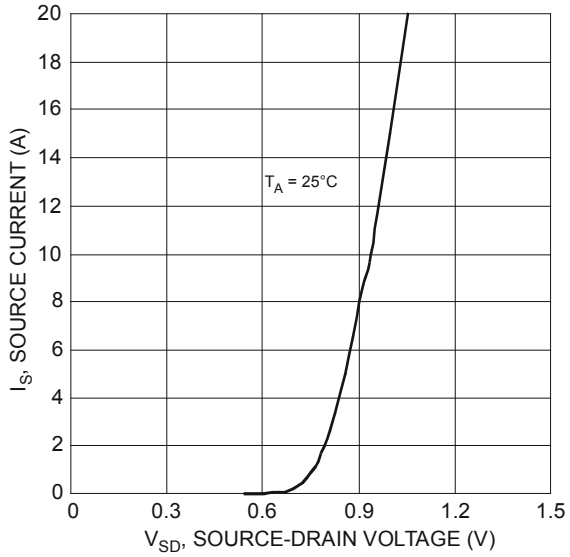


Figure 8 Diode Forward Voltage vs. Current

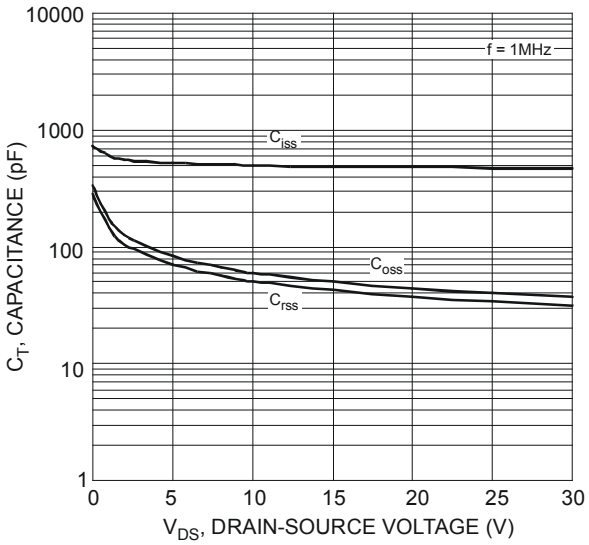


Figure 9 Typical Total Capacitance

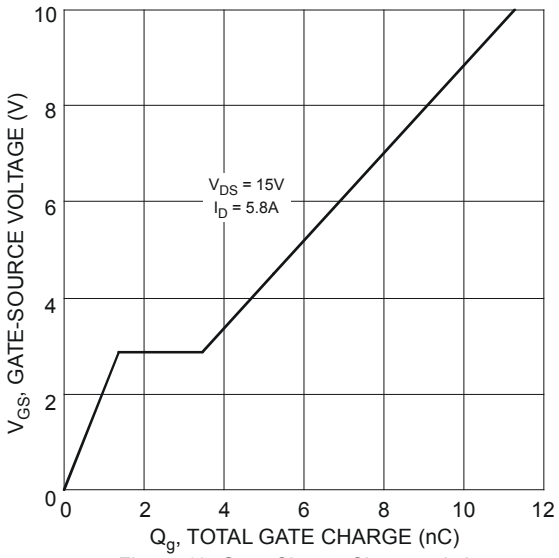


Figure 10 Gate-Charge Characteristics

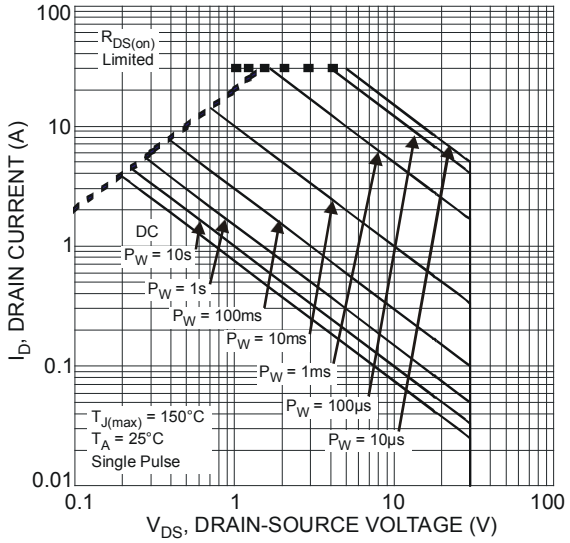


Figure 11 Safe Operation Area

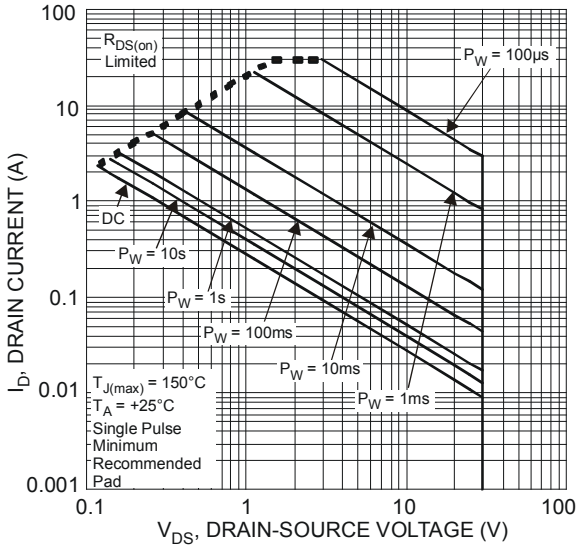


Figure 12 Safe Operation Area

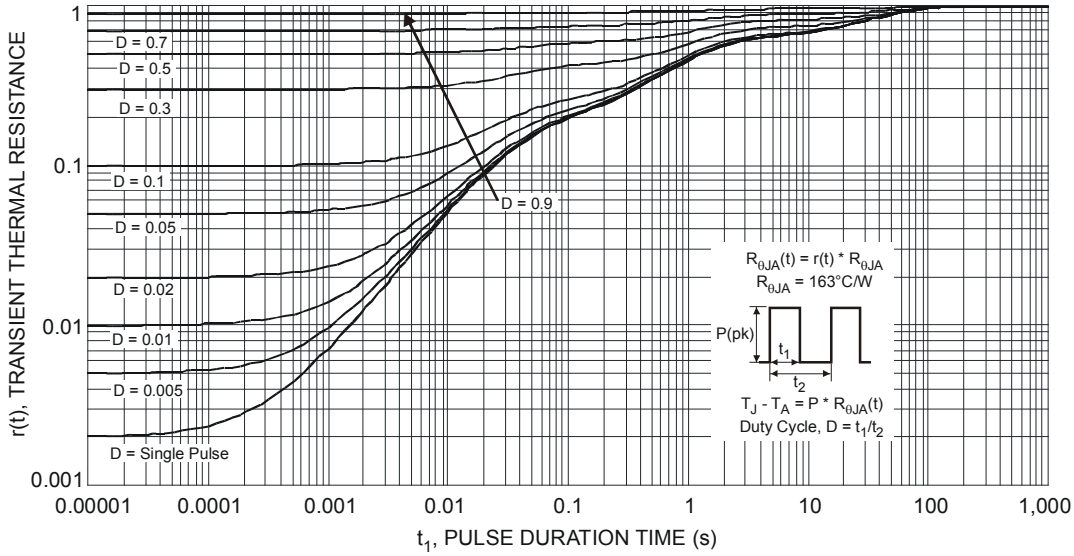
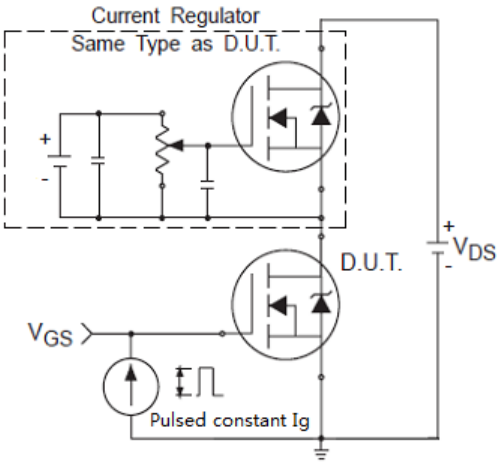
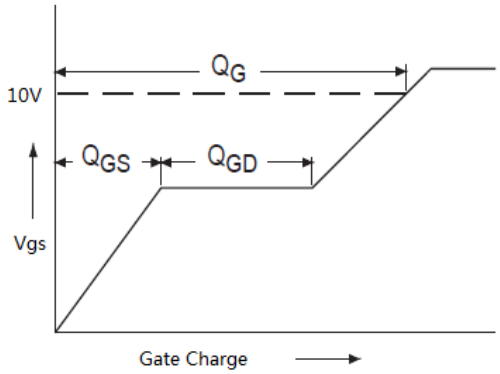


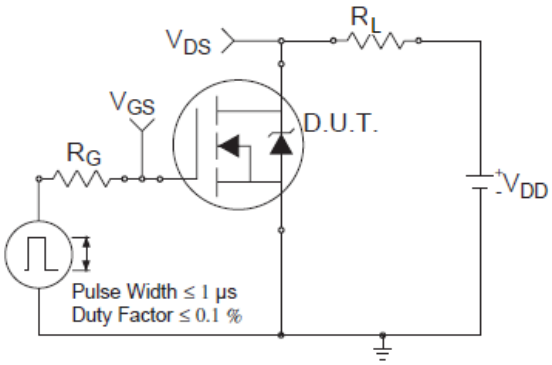
Figure 13 Transient Thermal Response

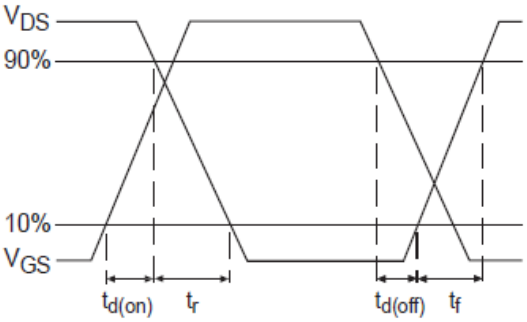
Gate Charge Test Circuit and Waveform





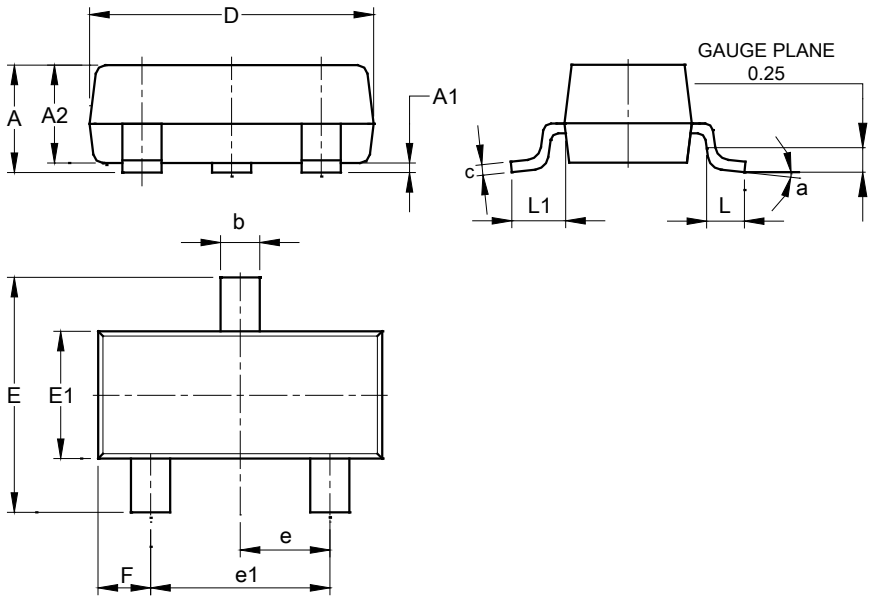
Switching Test Circuit and Waveform





Package Outline Dimensions

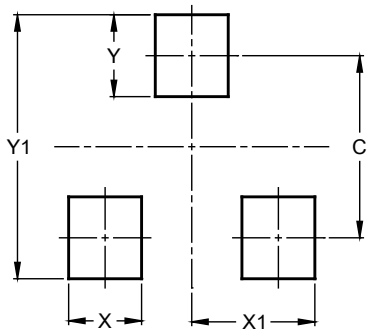
SOT23 (Standard)



SOT23 (Standard)			
Dim	**Min**	**Max**	**Typ**
A	0.90	1.15	1.025
A1	0.00	0.10	0.05
A2	0.85	1.10	0.975
b	0.30	0.51	0.40
c	0.080	0.202	0.11
D	2.80	3.00	2.90
E	2.25	2.55	2.40
E1	1.20	1.40	1.30
e	0.89	1.03	0.915
e1	1.78	2.05	1.83
F	0.40	0.60	0.535
L1	0.45	0.61	0.55
L	0.25	0.55	0.40
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

SOT23 (Standard)



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9