20V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
20V	0.200Ω @ V_{GS}=4.5V	2.1A
	0.240Ω @ V_{GS}=2.5V	1.9A
	0.310Ω @ V_{GS}=1.8V	1.7A

Features and Benefits

- Low On-Resistance
- Low Gate Drive Capability
- SOT26 (dual) Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description

This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

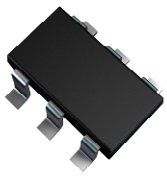
Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic.
  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
- Weight: 0.018 grams (Approximate)

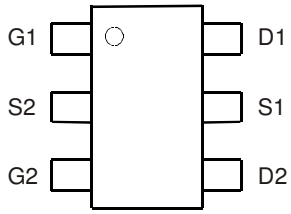
Applications

- Power Management Functions
- Disconnect Switches
- Relay Driving and Load Switching

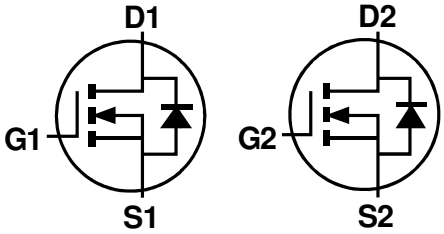
SOT26



Top View



Pin Out - Top View



Equivalent Circuit

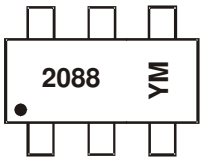
Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
ZXMN2088DE6TA	Standard	SOT26	3,000 / Tape & Reel
ZXMN2088DE6TC	Standard	SOT26	10,000 / Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

SOT26



2088 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: C = 2015)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021	2022
Code	C	D	E	F	G	H	I	J

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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

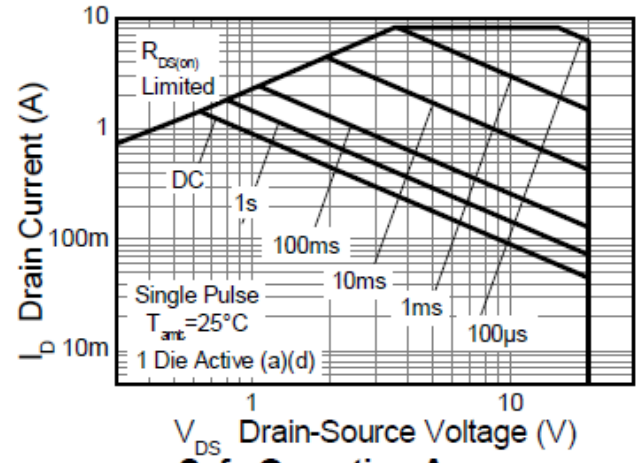
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GS}	±8	V
Continuous Drain Current	V_{GS} = 4.5V	T_A = +25°C (Notes 6 & 8)	I_D	2.1	A
		T_A = +70°C (Notes 6 & 8)		1.7	
		T_A = +25°C (Notes 5 & 8)		1.7	
Pulsed Drain Current		(Note 7)	I_{DM}	8	A

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

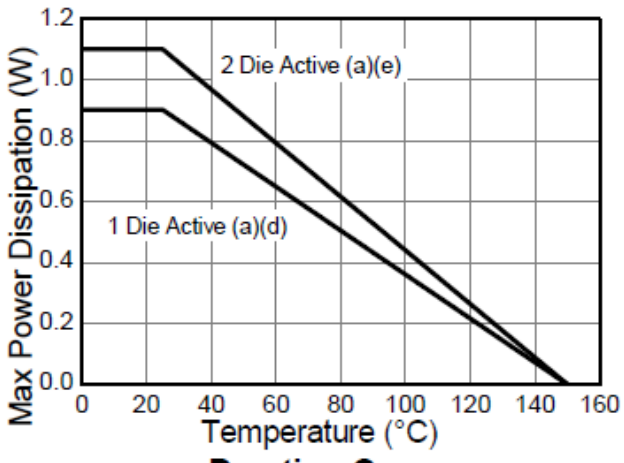
Characteristic		Symbol	Value	Unit
Power Dissipation at T_A = +25°C Linear Derating Factor	(Notes 5 & 8)	P_D	0.9 7.2	W mW/°C
	(Notes 5 & 9)	P_D	1.1 8.8	W mW/°C
	(Notes 6 & 8)	P_D	1.3 10.4	W mW/°C
Thermal Resistance, Junction to Ambient	(Notes 5 & 8)	$R_{\theta JA}$	139	°C/W
	(Notes 5 & 9)		113	
	(Notes 6 & 8)		96	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
6. Same as Note (5), except the device is measured at t ≤ 5 sec.
7. Same as Note (5), except the device is pulsed with D = 0.02 and pulse width 300µs. The pulse width is limited by the maximum junction temperature.
8. For device with one active die.
9. For device with two active die running at equal power.

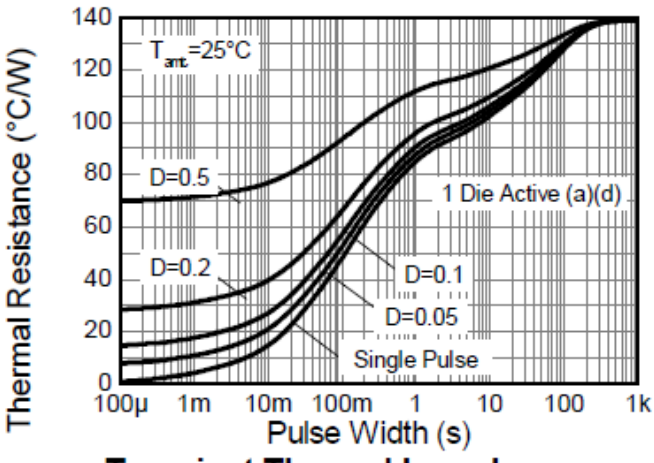
Thermal Characteristics



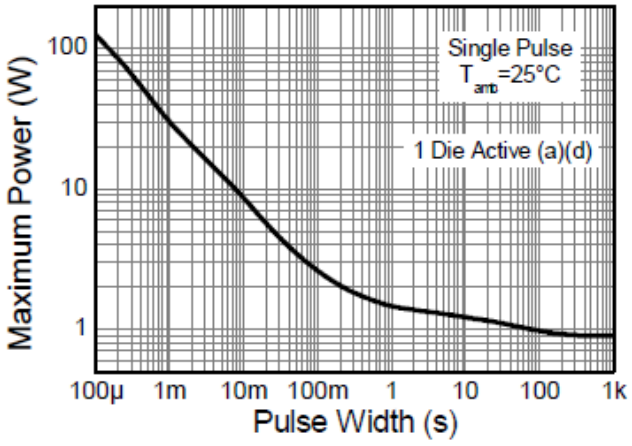
Safe Operating Area



Derating Curve



Transient Thermal Impedance



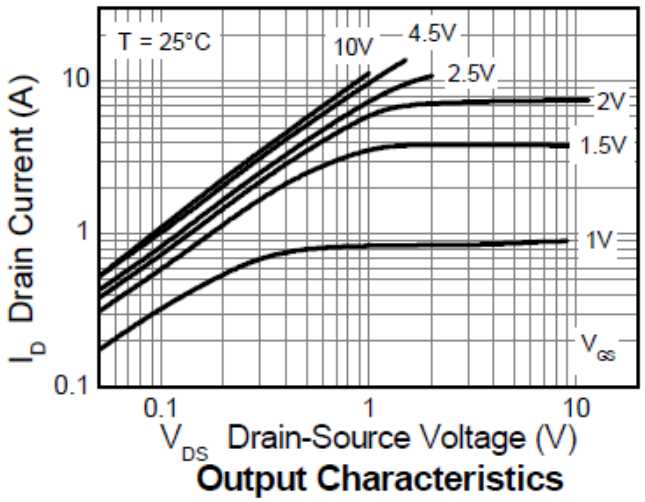
Pulse Power Dissipation

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

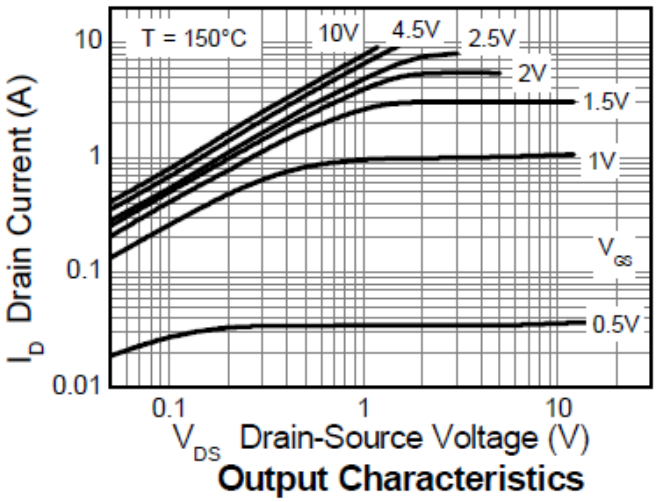
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	20	—	—	V	I_D = 250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	100	nA	V_{DS} = 3V, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	0.4	—	1.0	V	I_D = 250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 10)	$R_{DS(ON)}$	—	0.112	0.200	Ω	V_{GS} = 4.5V, I_D = 1.0A
			0.137	0.240		V_{GS} = 2.5V, I_D = 0.6A
			0.165	0.310		V_{GS} = 1.8V, I_D = 0.3A
Forward Transconductance (Notes 10 & 12)	g_{fs}	—	4.6	—	S	V_{DS} = 10V, I_D = 1.0A
Diode Forward Voltage (Note 12)	V_{SD}	—	0.75	0.95	V	I_S = 1.0A, V_{GS} = 0V, T_J = +25°C
DYNAMIC CHARACTERISTICS (Note 12)						
Input Capacitance	C_{iss}	—	279	—	pF	V_{DS} = 10V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	52	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	29	—	pF	
Total Gate Charge	Q_g	—	3.8	—	nC	V_{GS} = 4.5V V_{DS} = 10V I_D = 2.4A
Gate-Source Charge	Q_{gs}	—	0.41	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.56	—	nC	
Turn-On Delay Time (Note 11)	$t_{D(on)}$	—	2.0	—	ns	V_{DD} = 10V, V_{GS} = 4.5V I_D = 1.0A, $R_G \cong 6.0\Omega$
Turn-On Rise Time (Note 11)	t_r	—	3.2	—	ns	
Turn-Off Delay Time (Note 11)	$t_{D(off)}$	—	12.7	—	ns	
Turn-Off Fall Time (Note 11)	t_f	—	6.2	—	ns	
Reverse Recovery Time	t_{rr}	—	6.6	—	ns	I_F = 1.24A, di/dt = 100A/µs, T_J = +25°C
Reverse Recovery Charge	Q_{rr}	—	1.6	—	nC	

Notes:
10. Measured under pulsed conditions. Pulse width ≤ 300µs; duty cycle ≤ 2%.
11. Switching characteristics are independent of operating junction temperature.
12. For design aid only, not subject to production testing.

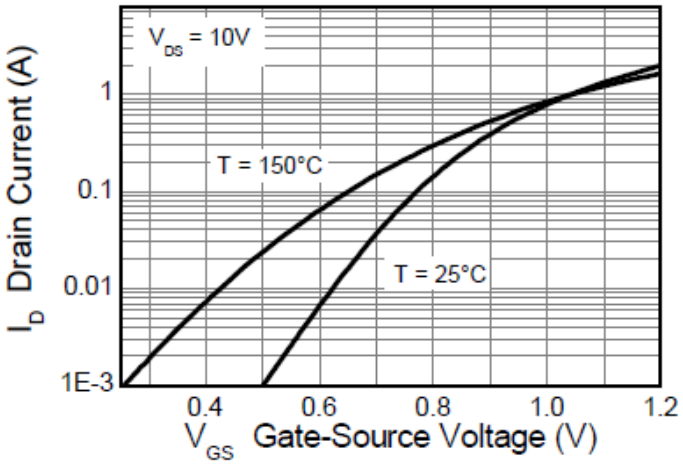
Typical Characteristics



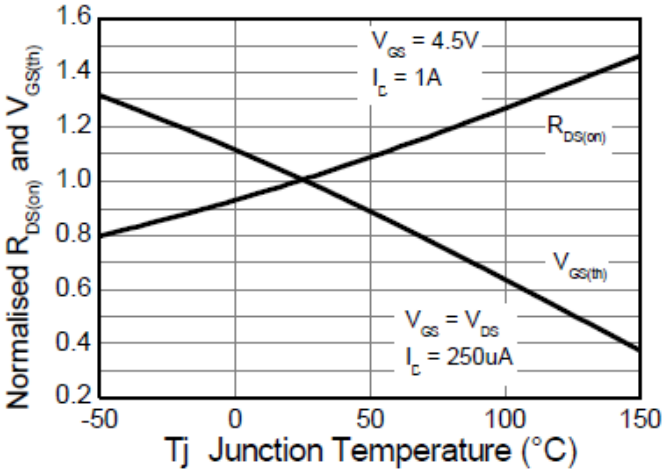
Output Characteristics



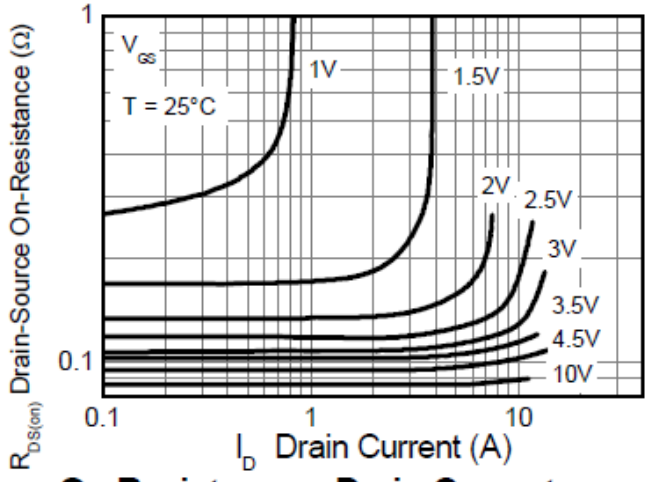
Output Characteristics



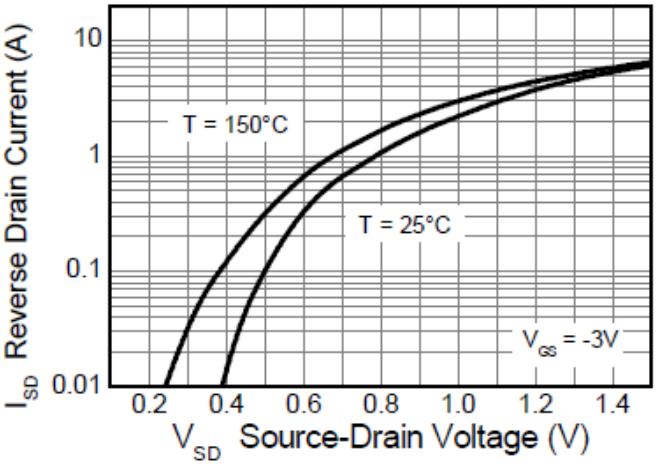
Typical Transfer Characteristics



Normalised Curves v Temperature

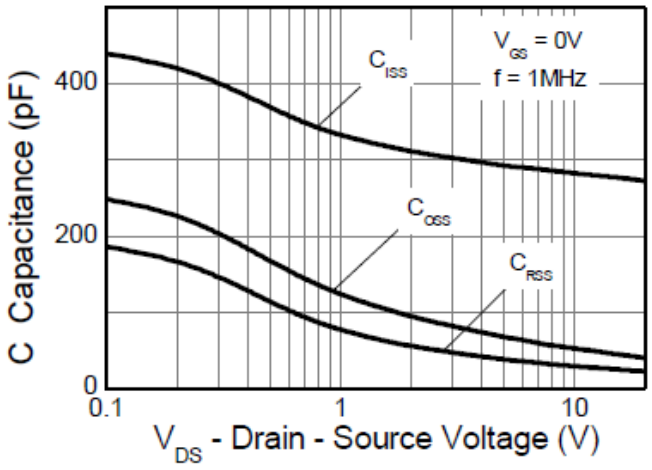


On-Resistance v Drain Current

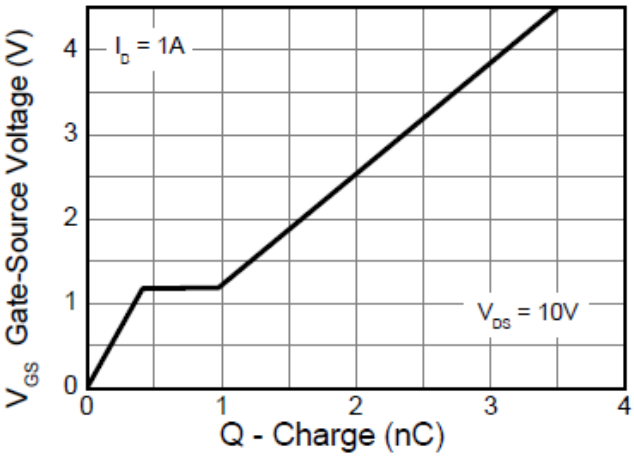


Source-Drain Diode Forward Voltage

Typical Characteristics (continued)

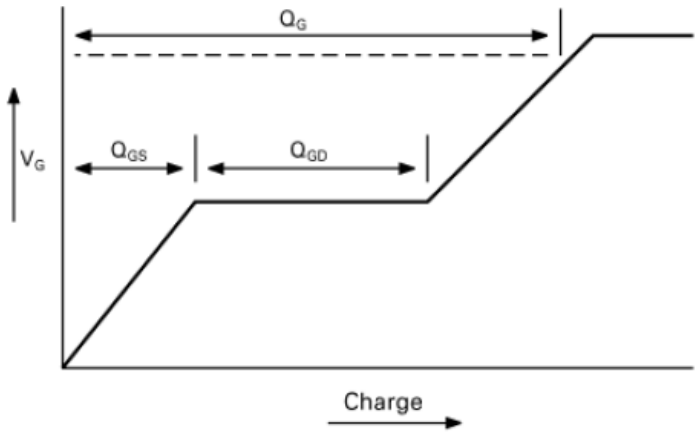


Capacitance v Drain-Source Voltage

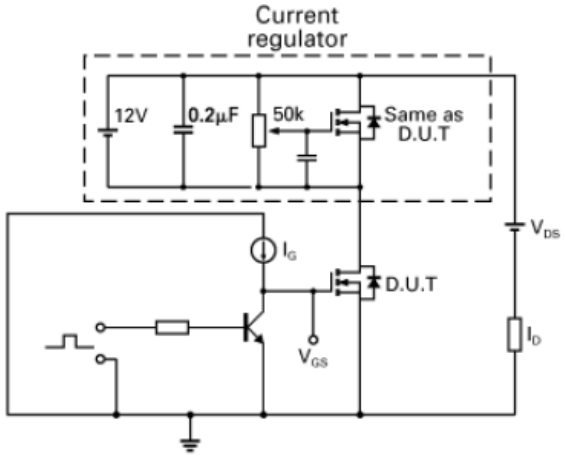


Gate-Source Voltage v Gate Charge

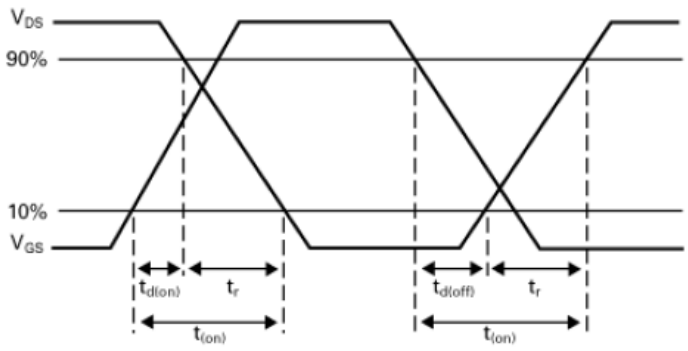
Test Circuits



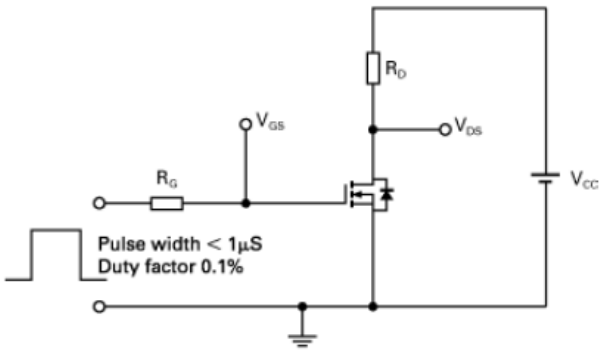
Basic gate charge waveform



Gate charge test circuit



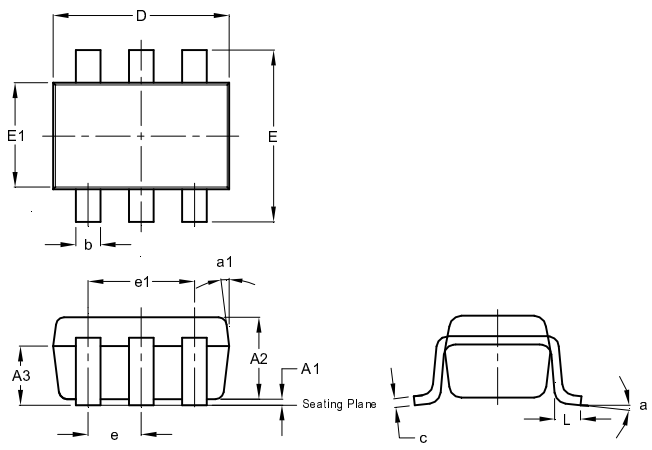
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

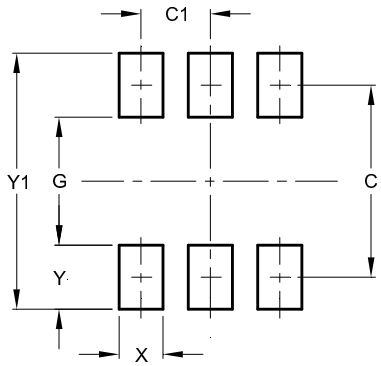
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



SOT26			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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