Description

ZXGD3009DY is a high-speed, non-inverting single gate driver for switching MOSFETs. It can transfer up to 1A peak source/sink current into the gate for effective charging and discharging of the capacitive load.

This gate driver ensures rapid switching of the MOSFET to minimize power losses and distortion in high current switching applications. It can typically drive 500mA into the low gate impedance with just 10mA input from a controller. The turn-on and turn-off switching behavior of the MOSFET can be individually tailored to suit an application. In particular, by defining the switching characteristics appropriately, EMI and cross conduction problems can be reduced.

Features

- High-Gain Buffer with Typically 500mA Output from 10mA Input
- Emitter-Follower that is Rugged to Latch-Up/Shoot-Through Issues
- Wide Supply Voltage to Minimize On-Losses
- Separate Source and Sink Outputs for Independent Control of MOSFET Turn-On and Turn-Off Times
- Optimized Pin-Out to Simplify PCB Layout and Reduce Parasitic Trace Inductances
- Near-Zero Quiescent Supply Current
- **Qualified to AEC-Q101 Standards for High Reliability**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

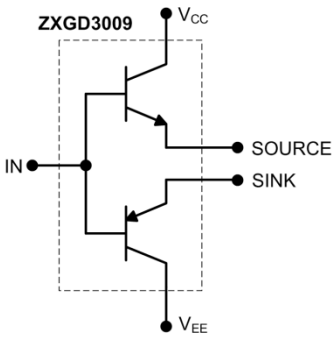
Applications

Power MOSFET Gate Driving in:

- Power Supplies
- DC-DC Converters
- Amplifier Output Stages

Mechanical Data

- Case: SOT363
- Case material: Molded Plastic, "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.018 grams (Approximate)

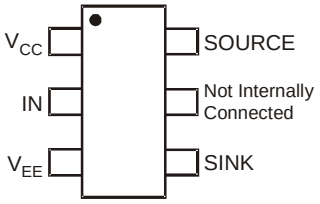


Internal Device Schematic

SOT363



Top View



Top View Pin-Out

Pin Name	Pin Function
V_{CC}	Supply Voltage High
IN	Driver Input
V_{EE}	Supply Voltage Low
SOURCE	Source Current Output *
SINK	Sink Current Output *

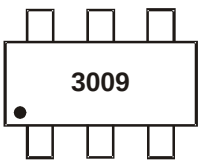
* Typically connect SOURCE & SINK together

Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
ZXGD3009DYTA	AEC-Q101	3009	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information



3009 = Product Type Marking Code

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

Characteristic	Symbol	Value	Unit
Supply Voltage, with Respect to V_{EE}	V_{CC}	40	V
Input Voltage, with Respect to V_{EE}	V_{IN}	40	V
Output Difference Voltage (Source – Sink)	$\Delta V_{(source-sink)}$	±7	V
Peak Pulsed Output Current (Source and Sink)	I_{OM}	±2	A
Peak Pulsed Input Current	I_{IM}	±1	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Notes 5 & 7)	P_D	320	mW
	(Notes 6 & 7)		277	
Thermal Resistance, Junction to Ambient	(Notes 5 & 7)	$R_{\theta JA}$	391	°C/W
	(Notes 6 & 7)		450	
Thermal Resistance, Junction to Lead (Note 8)		$R_{\theta JL}$	350	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 9)

Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with pin 1 (V_{CC}) and pin 3 (V_{EE}) on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in steady-state. The heatsink is split in half with pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
6. Same as Note 5, except the device is mounted on minimum recommended pad layout.
7. For device with two active die running at equal power.
8. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (V_{EE}).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

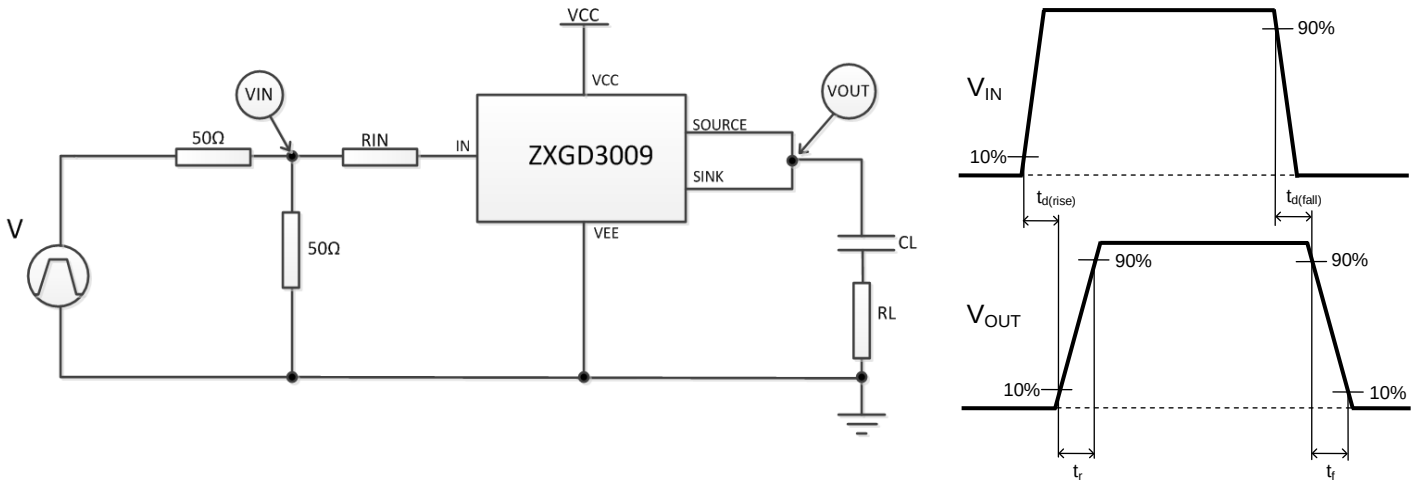
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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

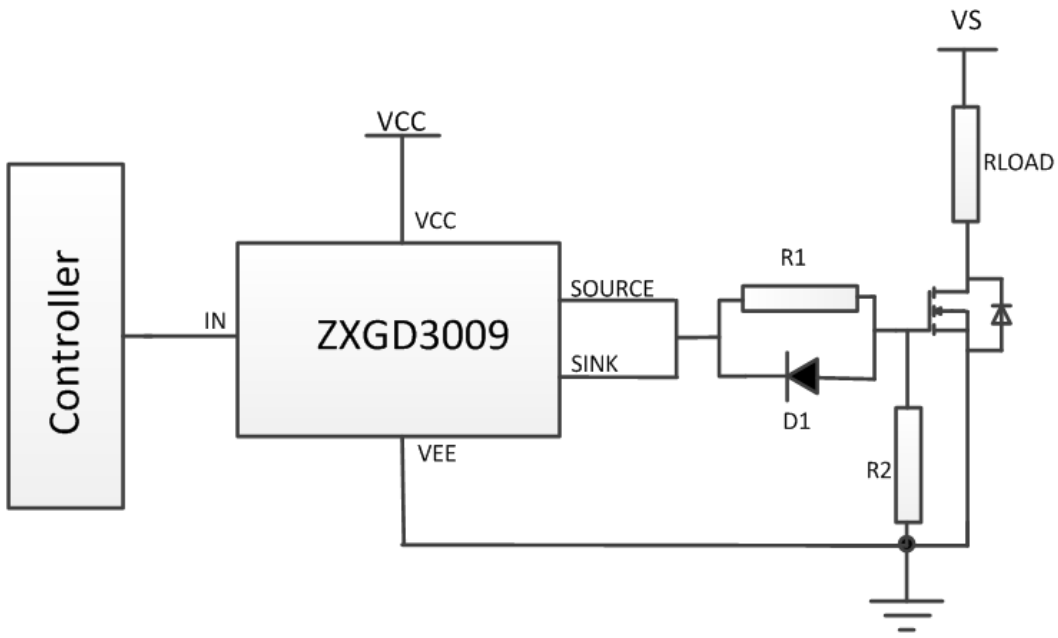
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage, High	V_{OH}	V_{CC} - 0.8	V_{CC} - 0.4	—	V	$I_{(source)}$ = 1µA, V_{IN} = V_{CC}
Output Voltage, Low	V_{OL}	—	V_{EE} + 0.2	V_{EE} + 0.5		$I_{(sink)}$ = 1µA, V_{IN} = V_{EE}
Supply Breakdown Voltage	BV_{CC}	40	—	—	V	I_Q = 100µA, V_{IN} = V_{CC}
		40	—	—		I_Q = 100µA, V_{IN} = V_{EE} = 0V
Quiescent Supply Current	I_Q	—	—	20	nA	V_{CC} = 32V, V_{IN} = V_{CC}
		—	—	20		V_{CC}= 32V, V_{IN} = V_{EE} = 0V
Peak Pulsed Source Current	$I_{(source)M}$	—	0.98	—	A	I_{IN}= 10mA, V_{CC} = 5V, V_{OUT}= 0V
Peak Pulsed Sink Current	$I_{(sink)M}$	—	0.78	—		I_{IN}=-10mA, V_{EE} = 0V, V_{OUT}= 5V
Peak Pulsed Source Current	$I_{(source)M}$	—	1.58	—	A	I_{IN}= 50mA, V_{CC} = 5V, V_{OUT}= 0V
Peak Pulsed Sink Current	$I_{(sink)M}$	—	1.38	—		I_{IN}=-50mA, V_{EE} = 0V, V_{OUT}= 5V
Peak Pulsed Source Current with Varying Input Resistances	$I_{(source)M}$	—	0.74 0.175 0.019	—	A	R_{IN} = 100Ω R_{IN} = 1kΩ R_{IN} = 10kΩ V_{CC} = 15V, V_{EE} = 0V V_{IN} = 15V C_L =1nF, R_L = 0.18Ω R_{SOURCE} = 0Ω, R_{SINK} = 0Ω
Peak Pulsed Sink Current with Varying Input Resistances	$I_{(sink)M}$	—	1.05 0.22 0.025	—	A	R_{IN} = 100Ω R_{IN} = 1kΩ R_{IN} = 10kΩ V_{CC} = 15V, V_{EE} = 0V V_{IN} = 15V C_L =1nF, R_L = 0.18Ω R_{SOURCE} = 0Ω, R_{SINK} = 0Ω
Switching Times with Low Input Resistance	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	3.8 15 4 15	—	ns	V_{CC} = 12V, V_{EE} = 0V V_{IN} = 0 to 10V R_{IN} = 25Ω C_L = 1nF, R_L = 0.18Ω R_{SOURCE} = 0Ω, R_{SINK} = 0Ω
Switching Times with Low Load Capacitance C_L = 1nF	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	18 36 16 40	—	ns	V_{CC} = 15V, V_{EE} = 0V V_{IN} = 0 to 15V R_{IN} = 1kΩ C_L = 1nF, R_L = 0.18Ω R_{SOURCE} = 0Ω, R_{SINK} = 0Ω
Switching Times with High Load Capacitance C_L = 10nF	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	47 210 39 240	—	ns	V_{CC} = 15V, V_{EE} = 0V V_{IN} = 0 to 15V R_{IN} = 1kΩ C_L = 10nF, R_L = 0.18Ω R_{SOURCE} = 0Ω, R_{SINK} = 0Ω

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Switching Test Circuit and Timing Diagram



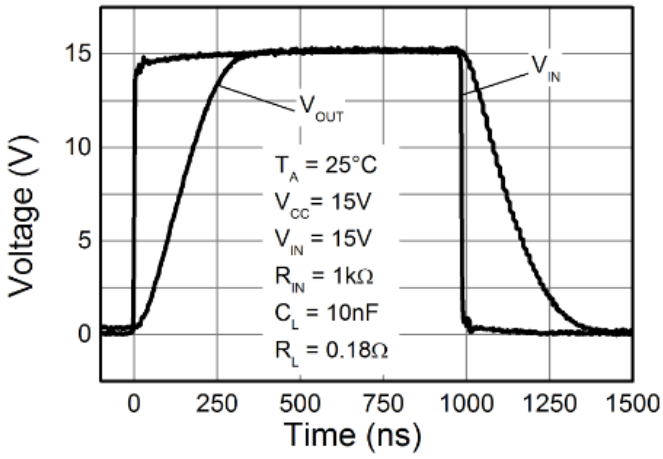
Typical Application Circuit



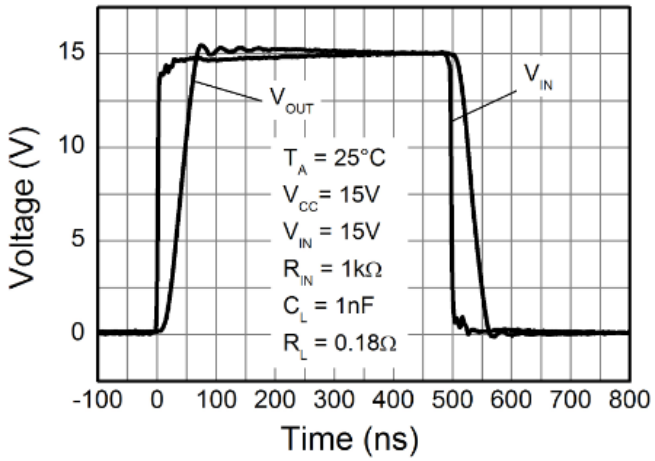
R1, D1 combination can be used for variable turn on and turn off times.

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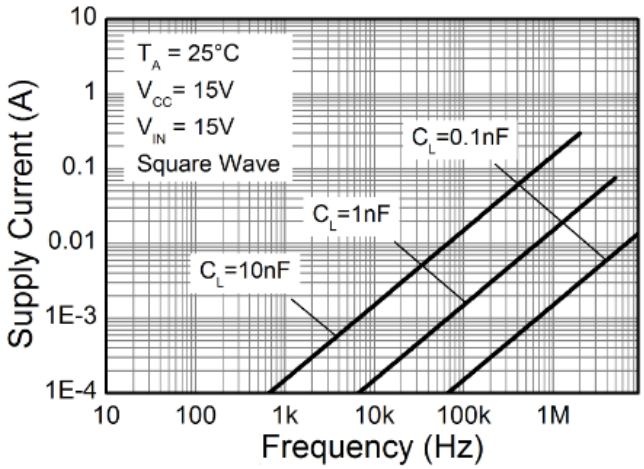
Typical Switching Characteristics (@T_A = +25°C, unless otherwise specified.)



Switching Speed



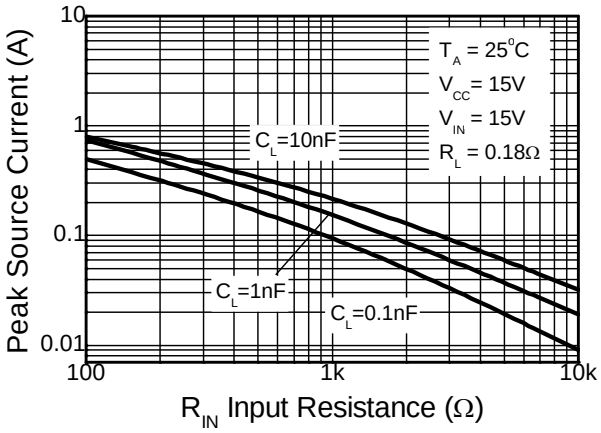
Switching Speed



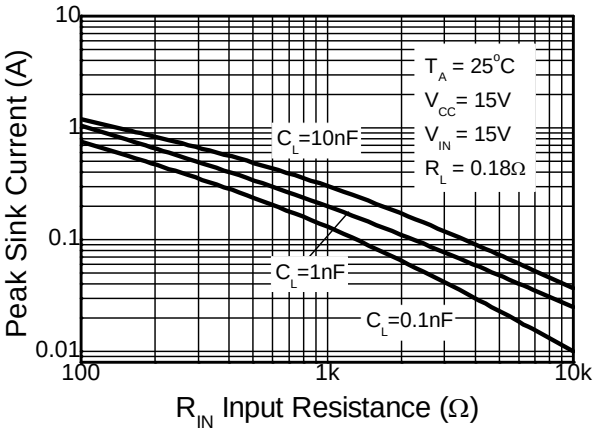
Supply Current

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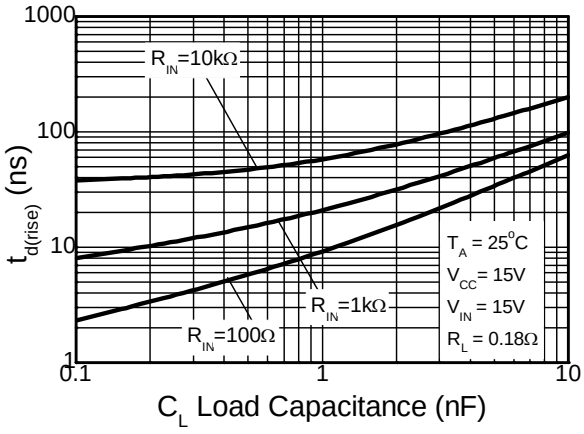
Typical Switching Characteristics (@T_A = +25°C, unless otherwise specified.)



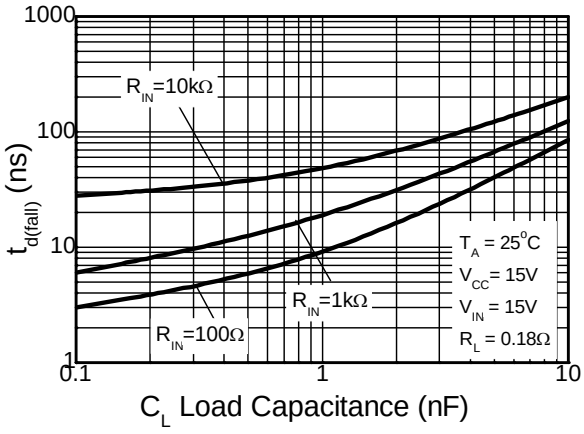
Source Current vs. Input Resistance



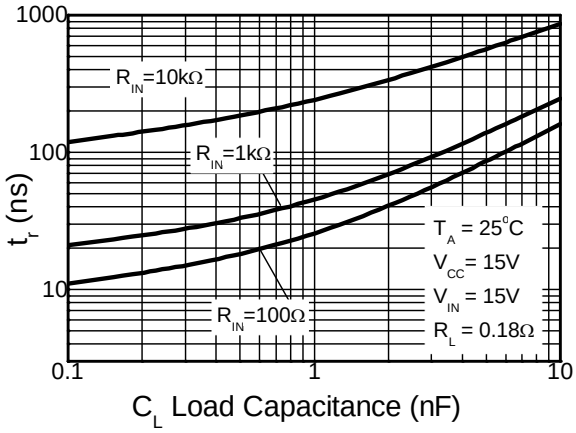
Sink Current vs. Input Resistance



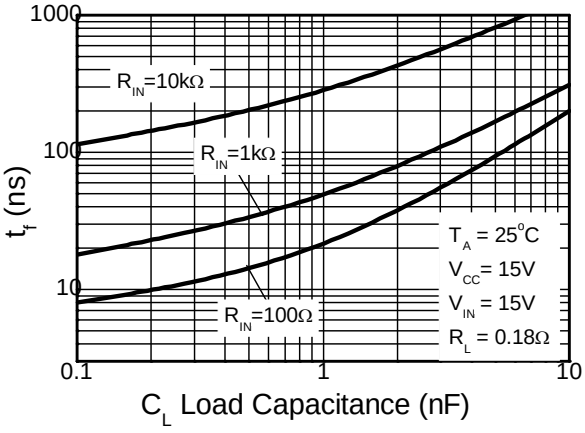
Turn-On Delay Time



Turn-Off Delay Time



Turn-On Rise Time



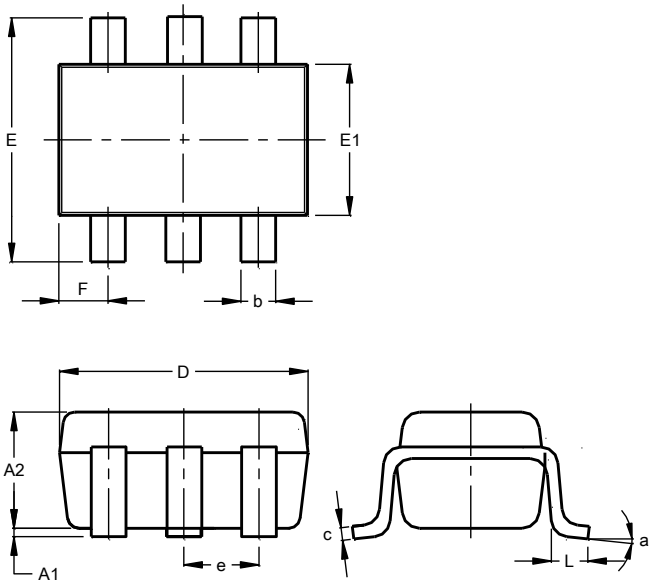
Turn-Off Fall Time

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Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT363

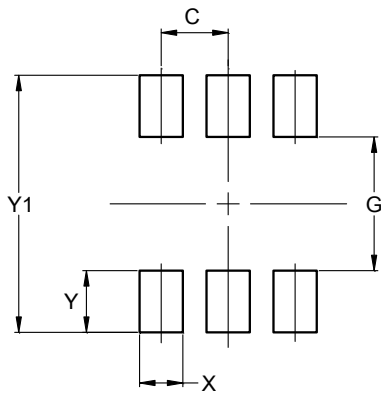


SOT363			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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