

Description

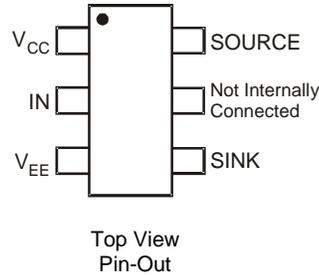
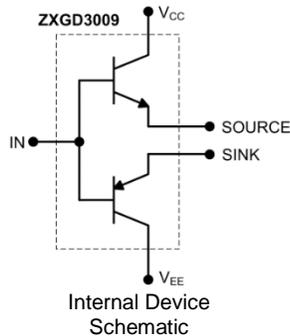
ZXGD3009E6 is a high-speed non-inverting single gate driver for switching MOSFETs. It can transfer up to 1A peak source/sink current into the gate for effective charging and discharging the capacitive gate load.

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. By defining the switching characteristics appropriately, EMI and cross conduction can be reduced.

Applications

Power MOSFET Gate Driving in:

- AC-DC Power Supplies (SMPS)
- DC-DC Converters
- DC-AC Inverters (i.e. Solar)
- 1-, 2-, and 3-Phase Motor Control Circuits
- Amplifier Output Stages



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

Features

- High-Gain Buffer With Typically 500mA Output from 10mA Input
- Rugged Emitter-Follower to Latch-up/Shoot-Through Issues
- Wide Supply Voltage to Minimize On-Losses
- 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)**

Mechanical Data

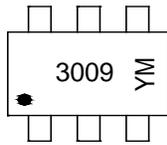
- Case: SOT26
- Case Material: Molded Plastic. "Green" Molding Compound
UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.018 grams (Approximate)

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXGD3009E6TA	AEC-Q101	3009	7	8	3000

- 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 <http://www.diodes.com/products/packages.html>.

Marking Information

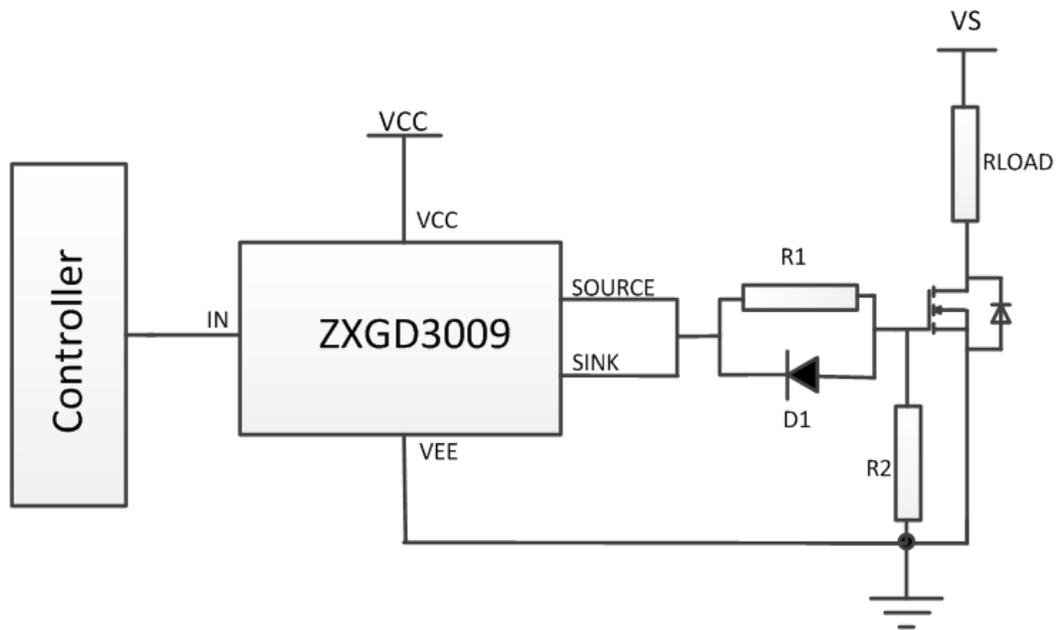


3009 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: E = 2017)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Code	F	G	H	I	J	K	L	M	N	P	Q	
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

Typical Application Circuit



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

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)	ΔV _(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 & 6)	P _D	1.1	W
Linear Derating Factor		8.8	mW/°C
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	R _{θJA}	113	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R _{θJL}	105	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 8)

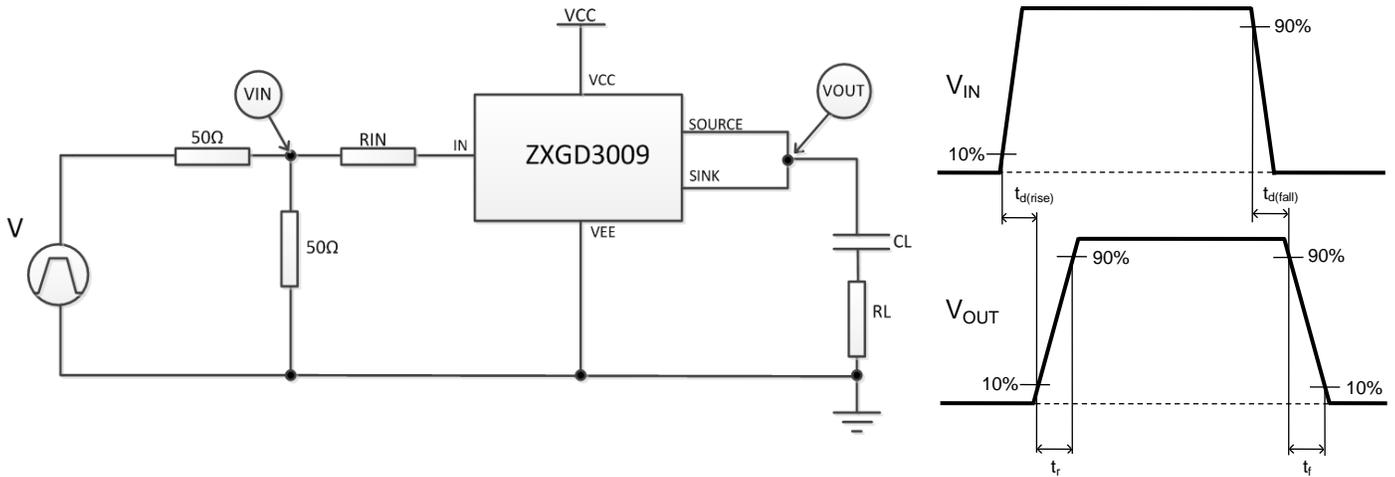
Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge—Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge—Machine Model	ESD MM	400	V	C

- Notes:
- 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 FR4 PCB; the 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.
 - For device with two active die running at equal power.
 - Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (V_{EE}).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

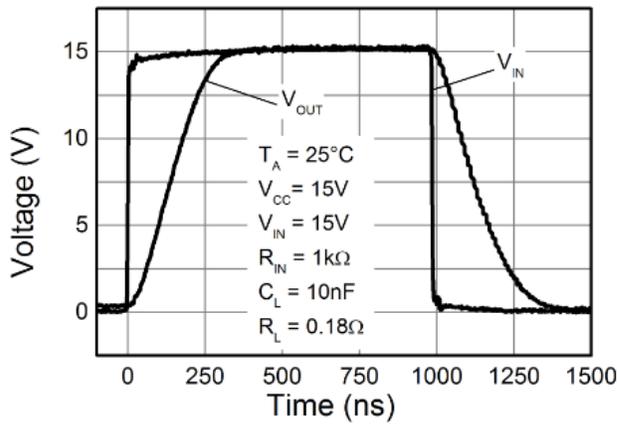
Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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

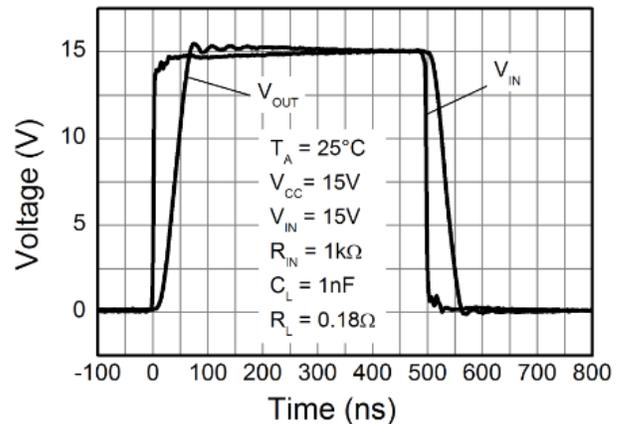
Switching Test Circuit and Timing Diagram



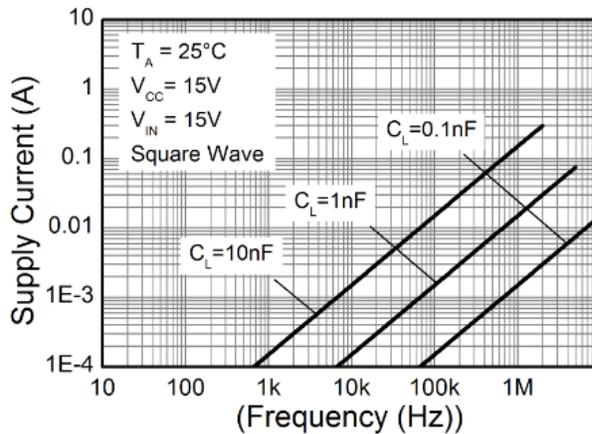
Typical Switching Characteristics (@ TA = +25°C, unless otherwise specified.)



Switching Speed

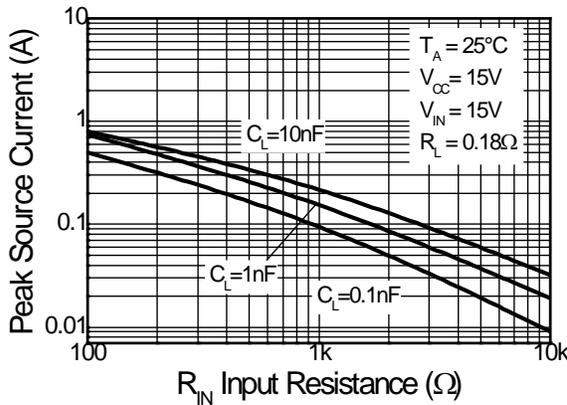


Switching Speed

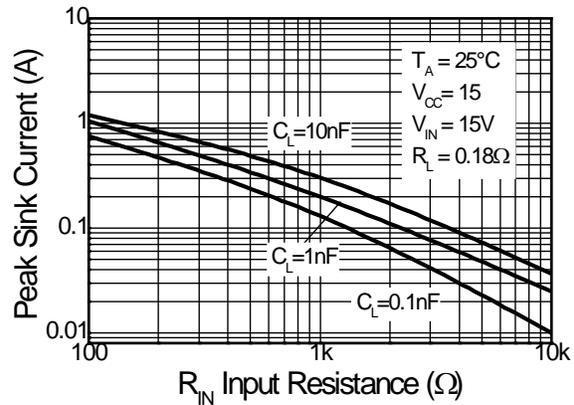


Supply Current

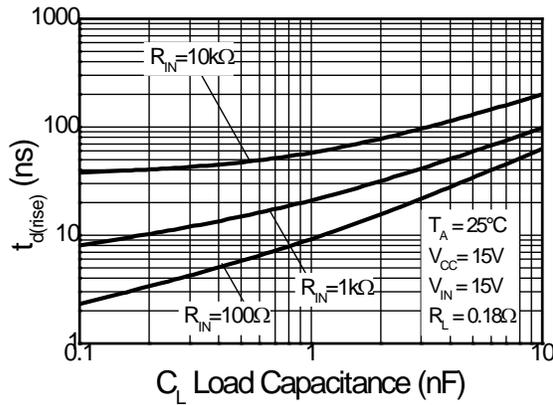
Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



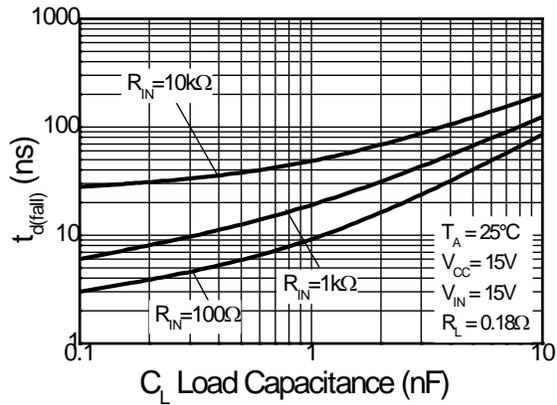
Source Current vs. Input Resistance



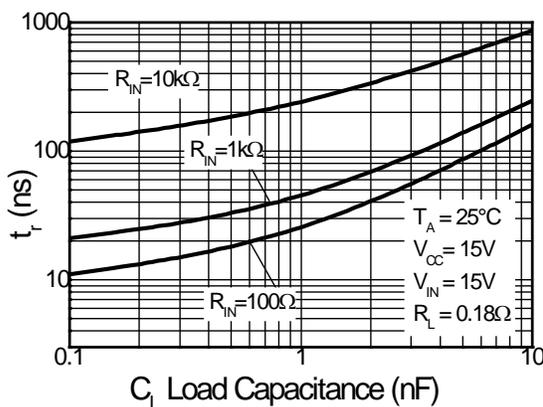
Sink Current vs. Input Resistance



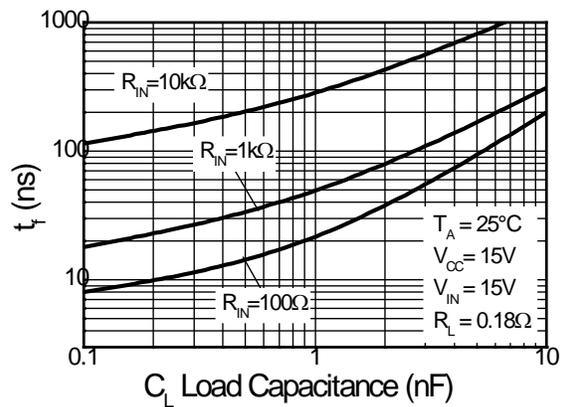
Turn-On Delay Time



Turn-Off Delay Time



Turn-On Rise Time

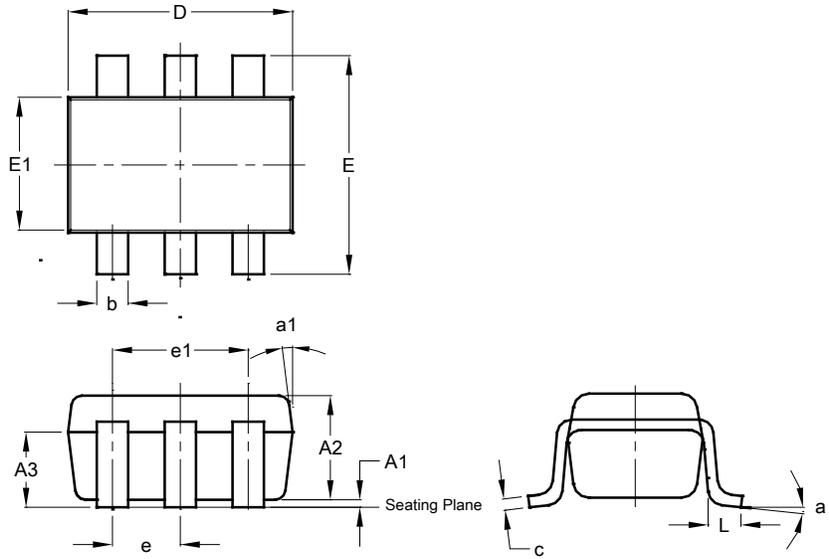


Turn-Off Fall Time

Package Outline Dimensions

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

SOT26 (SC74R)

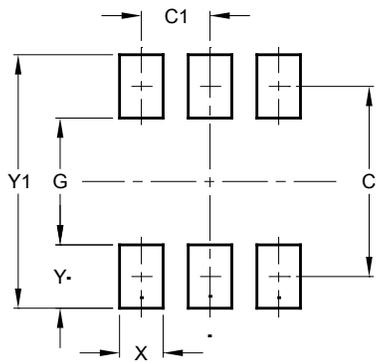


SOT26 (SC74R)			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	—	—	0.95
e1	—	—	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	—	—	8°
a1	—	—	7°
All Dimensions in mm			

Suggested Pad Layout

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

SOT26 (SC74R)



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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