

300mA, 24V, Ultra-Low IQ, Low Dropout LDO

1 Features

- Wide Input Voltage Range: up to 24V
- Absolute Maximum Ratings Input Voltage Range: up to 30V
- Output Current: 300mA
- Low IQ: 2.6 μ A Typically
- Low Dropout Voltage: 200mV @ I_{out}=100mA
- Low quiescent current, typical value 2.5 μ A
- Low temperature coefficient ± 50 ppm/ $^{\circ}$ C
- High accuracy $\pm 1\%$
- High PSRR: 65dB@1kHz

2 Applications

- Portable Electric Devices
- Battery Powered Equipment
- Smart Phones and Tables

3 Description

The GD30LD2409 series is a three-terminal linear regulator with high input voltage, low dropout, and low power consumption, implemented using CMOS technology. It provides an output current of up to 300mA and supports a input voltage of 24V. The output voltage range is from 1.5V to 5.0V. With CMOS technology, the chip achieves low dropout and low quiescent current.

Device Information¹

PART NUMBER	PACKAGE	BODY SIZE(NOM)
GD30LD2409	SOT89-3	4.50 mm x 2.40 mm
	SOT23-3	2.90 mm x 1.65 mm
	SOT23-5	2.92 mm x 1.60 mm
	DFN4	1.00 mm x 1.00 mm

1. For all available packages, see the [Package Information](#) and [Ordering Information](#) at the end of data sheet.

Simplified Application Schematic¹

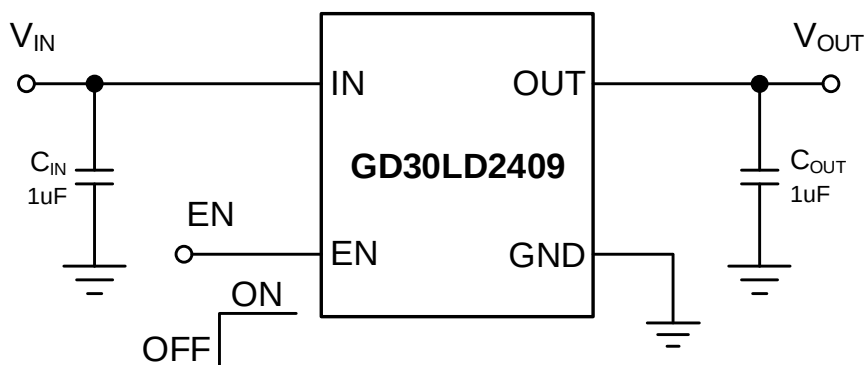
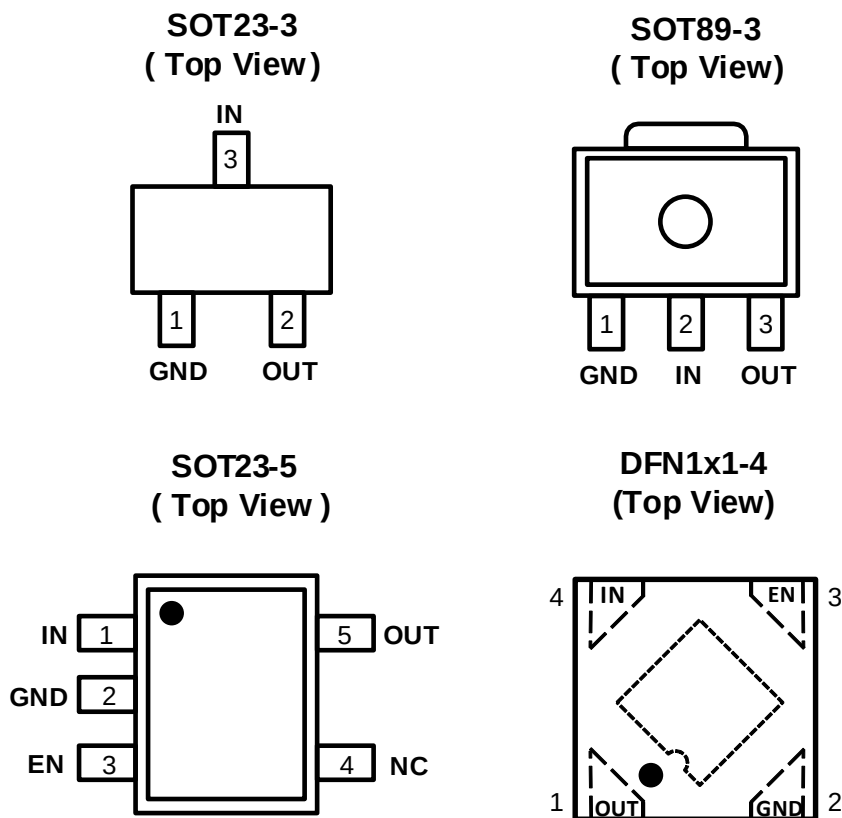


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4 Device Overview

4.1 Pinout and Pin Assignment



4.2 Pin Description

NAME	PIN NUMBER				PIN TYPE ¹	FUNCTION
	SOT23-3	SOT23-5	SOT89-3	DFN1x1-4		
GND	1	2	1	2	G	Ground pin.
IN	3	1	2	4	P	Power supply input pin.
OUT	2	5	3	1	P	Output pin.
EN		3		3	I	Enable control pin. Active high.
NC		4				No connection.

1. I = Input, P = Power, G = Ground.

5 Parameter Information

5.1 Absolute Maximum Ratings

Exceeding the operating temperature range(unless otherwise noted)¹

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{IN}	Input supply voltage range	-0.3	30	V
V_{EN}	Enable pin voltage range	$V_{IN} - 0.3$	$V_{IN} + 0.3$	V
I_{OUT}	Output current	0	500	mA
V_{OUT}	Output voltage range	-0.3	6	V
T_J	Operating junction temperature	-40	125	°C
T_{stg}	Storage temperature	-40	150	°C

1. The maximum ratings are the limits to which the device can be subjected without permanently damaging the device. Note that the device is not guaranteed to operate properly at the maximum ratings. Exposure to the absolute maximum rating conditions for extended periods may affect device reliability.

5.2 Recommended Operation Conditions

SYMBOL ^{1,2}	PARAMETER	MIN	TYP	MAX	UNIT
V_{IN}	Input supply voltage range	2.5		24	V
V_{OUT}	Output voltage range			5	V
T_A	Operating ambient temperature	-40		85	°C

1. The device is not guaranteed to function outside of its operating conditions.

5.3 Electrical Sensitivity

SYMBOL	CONDITIONS	VALUE	UNIT
$V_{ESD(HBM)}$	Human-body model (HBM), ANSI/ESDA/JEDEC JS-001-2017 ¹	±2000	V
$V_{ESD(CDM)}$	Charge-device model (CDM), ANSI/ESDA/JEDEC JS-002-2022 ²	±500	V

1. JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
2. JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

5.4 Thermal Resistance

SYMBOL ¹	CONDITIONS	PACKAGE	VALUE	UNIT
Θ_{JA}	Natural convection, 2S2P PCB	SOT23-3	360	°C/W
		SOT23-5	250	
		SOT89-3	135	
		DFN1x1-4	120	

1. Thermal characteristics are based on simulation, and meet JEDEC document JESD51-7.

5.5 Electrical Characteristics

$V_{IN} = V_{OUT} + 1V$, $I_{OUT} = 10mA$, $C_{IN} = C_{OUT} = 1.0\mu F$, $T_A = 25^{\circ}C$, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Operating input voltage		2.5		24	V
V_{OUT}	Output voltage accuracy	$I_{OUT} = 10mA$	$V_{OUT} * 0.99$		$V_{OUT} * 1.01$	V
I_Q	Quiescent current	$I_{OUT} = 0mA$		2.5	6	μA
I_{SD}	Shutdown current	$V_{EN} = 0V$			0.2	μA
I_{SHORT}	Short-circuit current	Output short circuit		55		mA
I_{LIM}	Output current limiting		500			mA
V_{DO}	Dropout voltage	$I_{OUT} = 100mA$		200		mV
R_{DIS}	Discharge resistance	$V_{EN} < 0.4V$		350		Ω
R_{egLINE}	Line regulation	$V_{OUT} + 1V \leq V_{IN} \leq 20V$, $I_{OUT} = 10mA$		0.05		%/V
R_{egLOAD}	Load regulation	$1mA \leq I_{OUT} \leq 100mA$, $V_{IN} = V_{OUT} + 1V$		5	20	mV/A
V_{EN_RISE}	Rising enable threshold	EN input voltage high	1.5			V
V_{EN_FALL}	Falling enable threshold	EN input voltage low			0.4	V
$\Delta V_{OUT} / (\Delta T_A * V_{OUT})$	Temperature coefficient			± 5		ppm
PSRR	Power supply rejection ration	$V_{IN} = 4.3V$	$f = 100Hz$	80		dB
		$V_{OUT} = 3.3V$	$f = 1KHz$	65		
		$I_{OUT} = 10mA$	$f = 10KHz$	50		
T_{TSD}	Thermal shutdown temperature ¹	Temperature rise		160		$^{\circ}C$
T_{HYS}	Thermal shutdown hysteresis ¹	Temperature falling		25		$^{\circ}C$

1. Guaranteed by design and engineering sample characterization.

5.6 Typical Characteristics

$C_{IN} = C_{OUT} = 1\mu F$, $T_A = 25^\circ C$, unless otherwise noted.

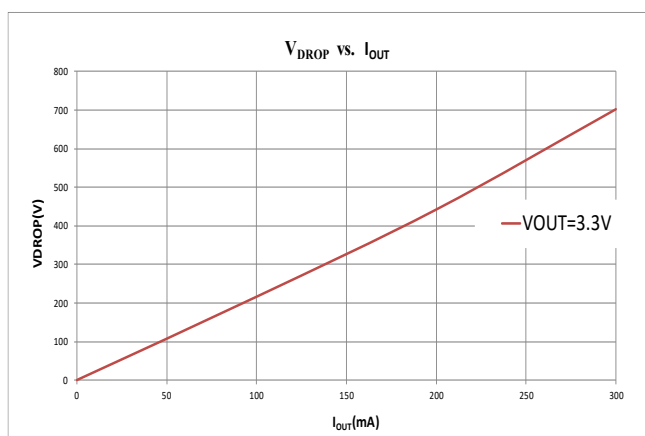


Figure 1. Dropout Voltage vs. Output Current

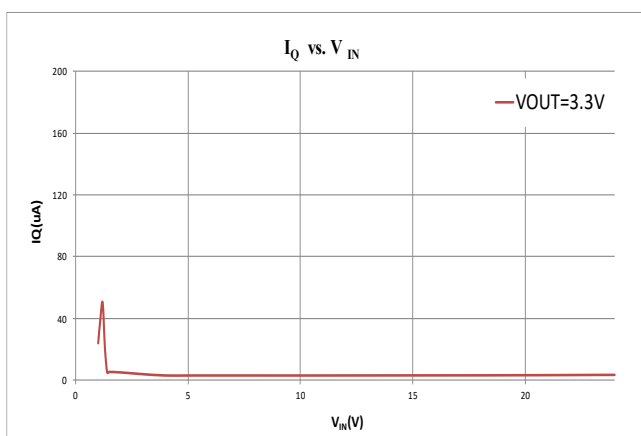


Figure 2. Quiescent Current vs. Input Voltage

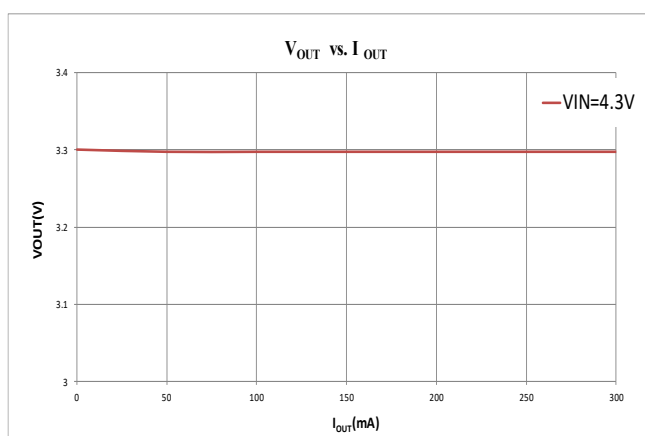


Figure 3. Output Voltage vs. Output Current

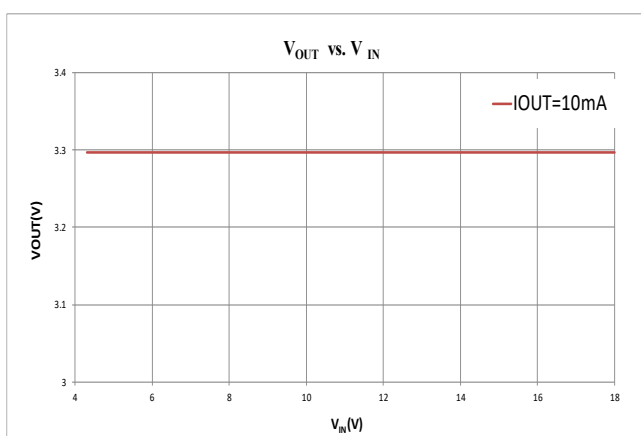


Figure 4. Output Voltage vs. Input Voltage

6 Functional Description

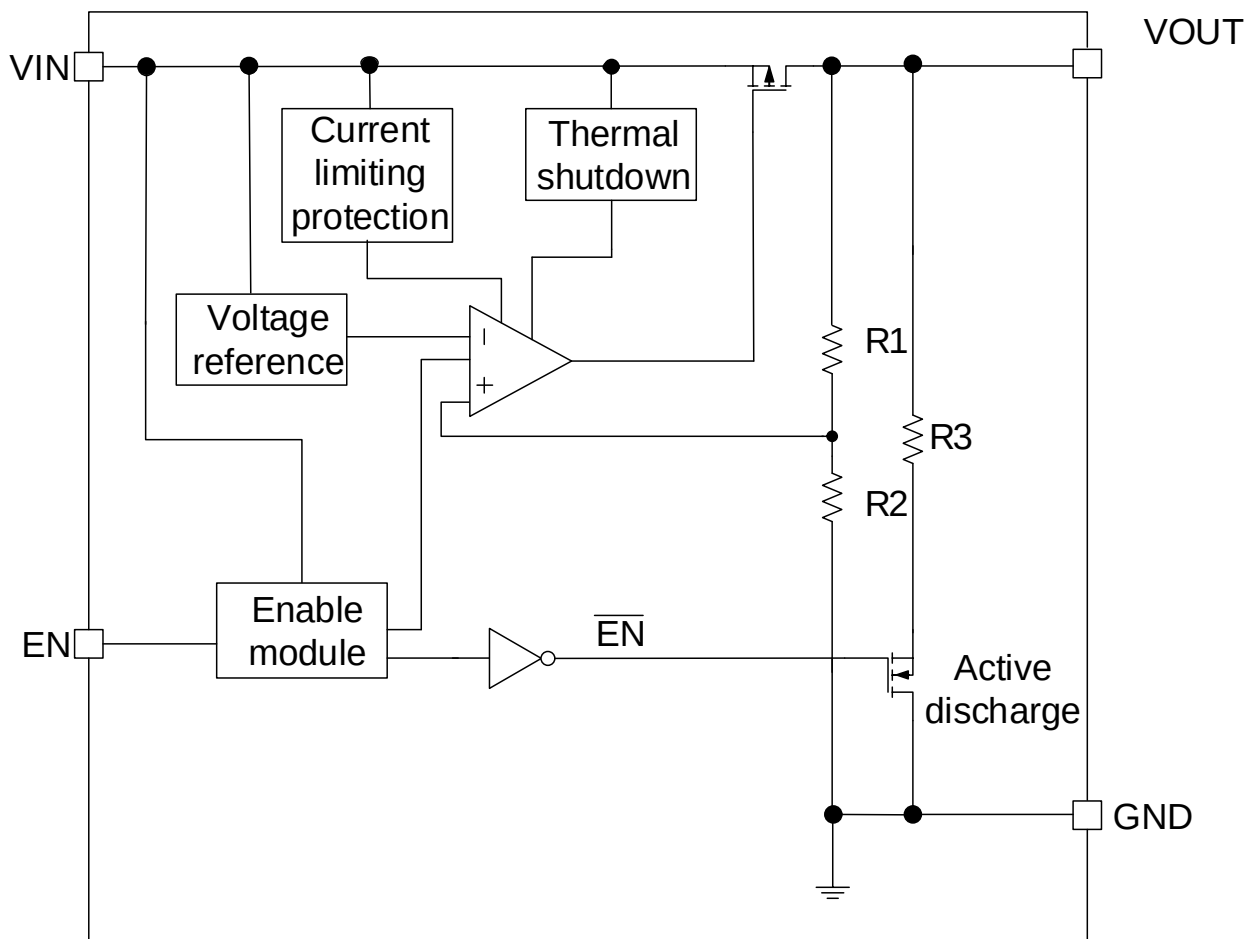


Figure 5. GD30LD2409 Functional Block Diagram

7 Application Information

7.1 Typical Application Circuit

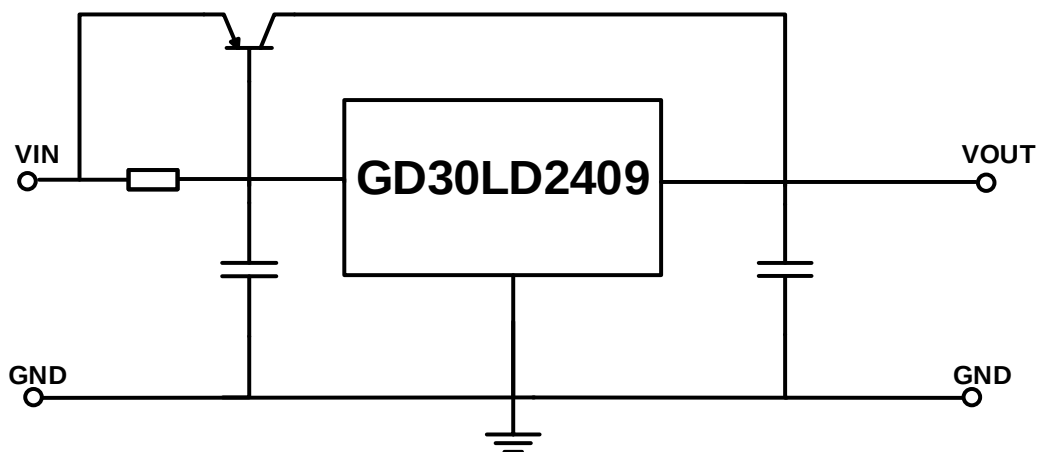


Figure 6. High output current positive voltage regulator circuit

8 Layout Guidelines and Example

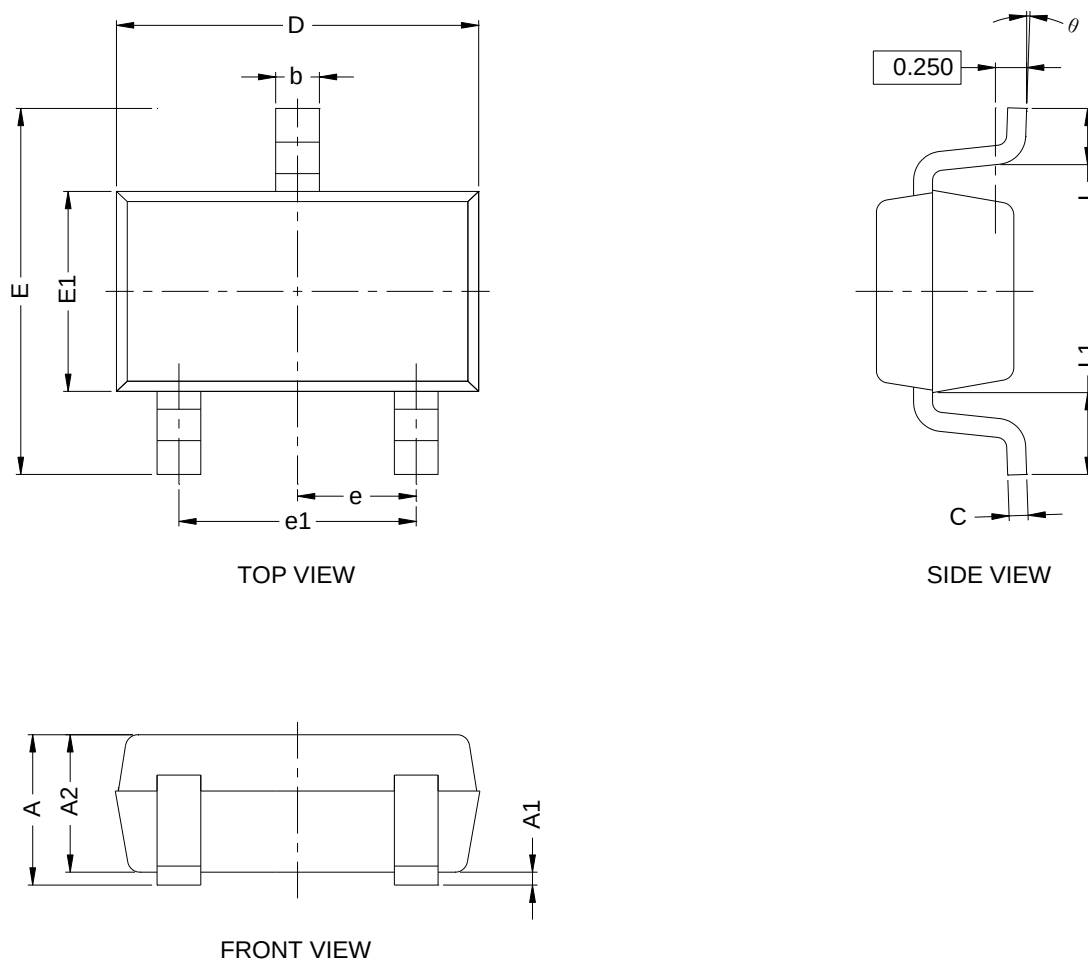
By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the GD30LD2409 ground pin using as wide and as short of a copper trace as is practical.

Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.

9 Package Information

9.1 Outline Dimensions

SOT23-3 Package Outline



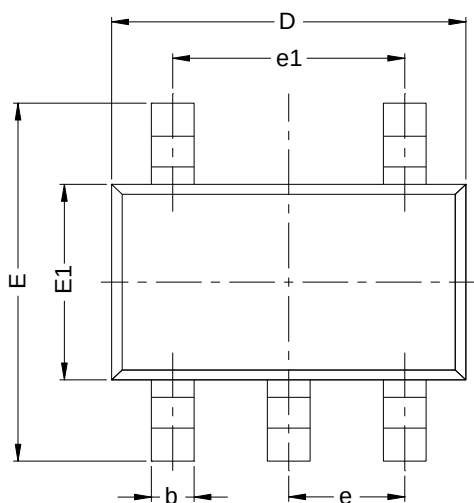
NOTES:

1. All dimensions are in millimeters.
2. Package dimensions does not include mold flash, protrusions, or gate burrs.
3. Refer to the [Table 1 SOT23-3 dimensions\(mm\)](#).

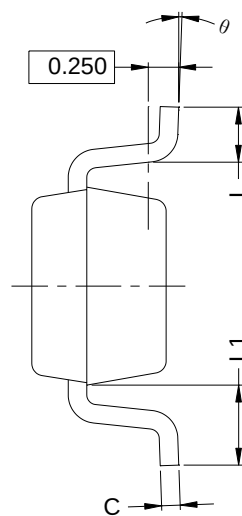
Table 1. SOT23-3 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.050		1.450
A1	0		0.150
A2	0.900		1.300
b	0.250		0.500
c	0.100		0.250
D	2.800		3.100
E	2.600		3.100
E1	1.500		1.800
e	0.950 BSC		
e1	1.900 BSC		
L	0.250		0.600
L1	0.59 TYP		
θ	0°		8°

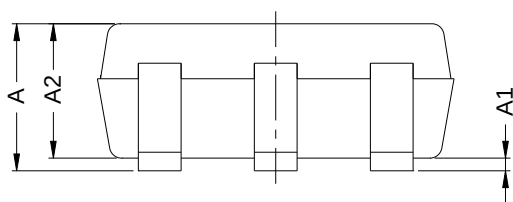
SOT23-5 Package Outline



TOP VIEW



SIDE VIEW



FRONT VIEW

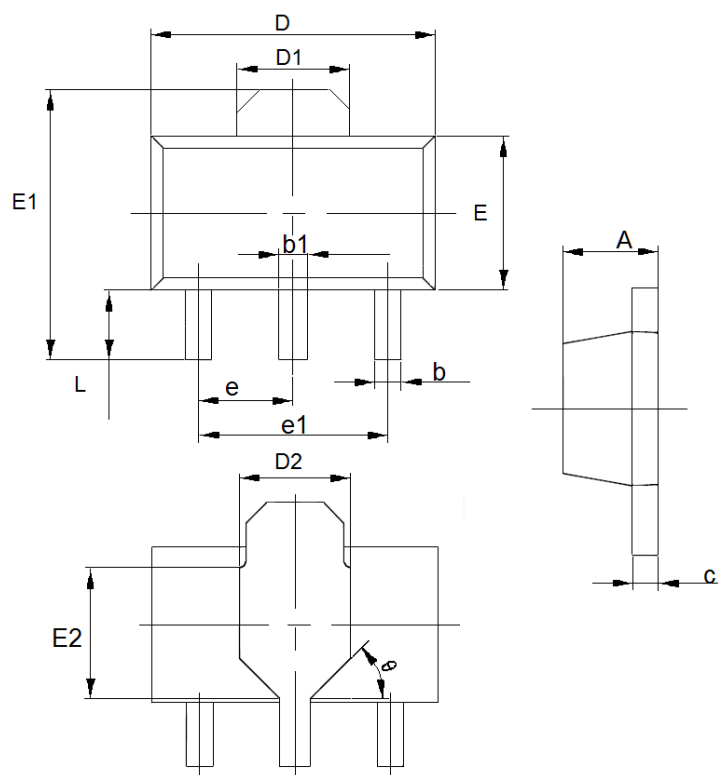
NOTES: (continued)

1. Refer to the [Table 2 SOT23-5 dimensions\(mm\)](#).

Table 2. SOT23-5 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.050		1.250
A1	0		0.100
A2	1.050		1.150
b	0.300		0.500
c	0.100		0.200
D	2.820		3.020
E	2.650		2.950
E1	1.500		1.700
e	0.950 BSC		
e1	1.900 BSC		
L	0.300		0.600
L1	0.59 TYP		
θ	0°		8°

SOT89-3 Package Outline



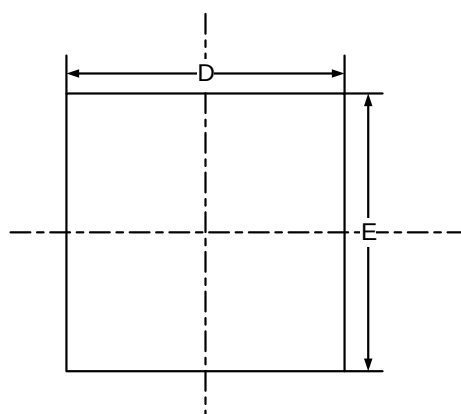
NOTES: (continued)

1. Refer to the [Table 3 SOT89-3 dimensions\(mm\)](#).

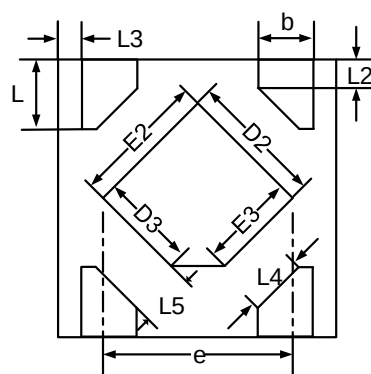
Table 3. SOT89-3 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	1.400		1.600
b	0.320		0.520
B1	0.400		0.580
c	0.350		0.450
D	4.400		4.600
D1	1.550 TYP		
D2	1.750 TYP		
e1	3.000 TYP		
E	2.300		2.600
E1	3.940		4.400
e	1.500 TYP		
L	0.800		1.200
θ	45°		

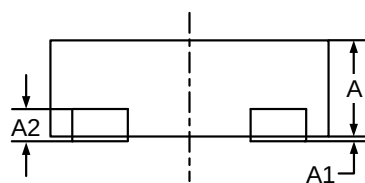
DFN1x1-4 Package Outline



TOP VIEW



BOTTOM VIEW



FRONT VIEW

NOTES: (continued)

1. Refer to the [Table 4 DFN1x1-4 dimensions\(mm\)](#).

Table 4. DFN1x1-4 dimensions(mm)

SYMBOL	MIN	NOM	MAX
A	0.45	0.50	0.55
A1	0.00	0.025	0.05
A2	0.125REF		
b	0.15	0.20	0.25
D	0.95	1.00	1.05
D2	0.38	0.48	0.58
D3	0.230	0.330	0.430
E	0.95	1.00	1.05
e	0.65BSC		
E2	0.38	0.48	0.58
E3	0.230	0.330	0.430
L	0.15	0.25	0.35
L2	0.103REF		
L3	0.075REF		
L4	0.208REF		
L5	0.19	0.195	0.35

10 Ordering Information

Ordering Code	Package Type	ECO Plan	Packing Type	MPQ	OP Temp(°C)
GD30LD2409BSTR-I18	SOT23-3	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409BSTR-I30	SOT23-3	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409BSTR-I33	SOT23-3	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409BSTR-I44	SOT23-3	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409BSTR-I50	SOT23-3	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409NSTR-I18	SOT23-5	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409NSTR-I30	SOT23-5	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409NSTR-I33	SOT23-5	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409NSTR-I44	SOT23-5	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409NSTR-I50	SOT23-5	Green	Tape & Reel	3000	-40°C to +85°C
GD30LD2409BWTR-I18	SOT89-3	Green	Tape & Reel	1000	-40°C to +85°C
GD30LD2409BWTR-I30	SOT89-3	Green	Tape & Reel	1000	-40°C to +85°C
GD30LD2409BWTR-I33	SOT89-3	Green	Tape & Reel	1000	-40°C to +85°C
GD30LD2409BWTR-I44	SOT89-3	Green	Tape & Reel	1000	-40°C to +85°C
GD30LD2409BWTR-I50	SOT89-3	Green	Tape & Reel	1000	-40°C to +85°C
GD30LD2409JETR-I18	DFN1x1-4	Green	Tape & Reel	10000	-40°C to +85°C
GD30LD2409JETR-I30	DFN1x1-4	Green	Tape & Reel	10000	-40°C to +85°C
GD30LD2409JETR-I33	DFN1x1-4	Green	Tape & Reel	10000	-40°C to +85°C
GD30LD2409JETR-I44	DFN1x1-4	Green	Tape & Reel	10000	-40°C to +85°C
GD30LD2409JETR-I50	DFN1x1-4	Green	Tape & Reel	10000	-40°C to +85°C

11 Revision History

REVISION NUMBER	DESCRIPTION	DATE
1.0	Initial release and device details	July 16, 2024
1.1	Add 1.8V output voltage	December 19, 2025
1.2	Add new package	August 11, 2026

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