

LC2319

Built-in 2A Power MOSFET Step-down DC-DC Converter

DESCRIPTION

LC2319 is a current mode PWM step-down DC-DC converter that has an internal 2A power switch. It has a wide input voltage range of 3.6V to 20V, which make it suitable for regulating a wide variety of power sources.

LC2319 is made up of a PWM control circuit, a reference voltage unit, an error amplifier, a protection circuit, Chip Enable circuit, and under voltage lockout circuit. A low ripple high efficiency step-down DC-DC converter can be easily assembled by this IC with minimum external components: an inductor, a diode, capacitors and resistors. Desired output voltage can be achieved by adjusting the value of external resistors.

The LC2319 has cycle-by-cycle current limit circuitry; current limiting provides protection against shorted output. The low current (<5uA) shutdown provides complete output disconnect, enabling easy power management in battery powered systems.

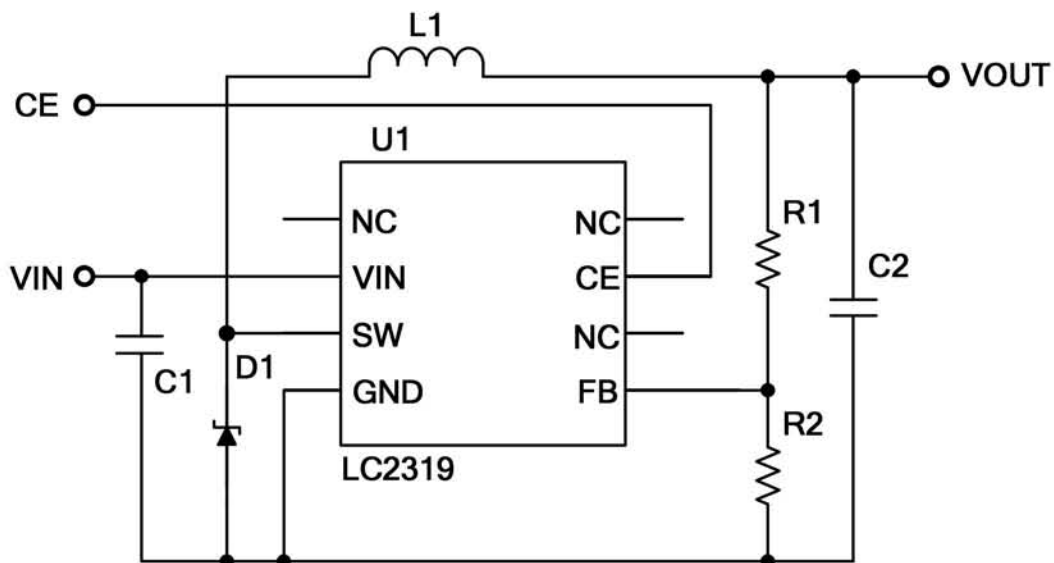
FEATURES

- ◆ Range of Input Voltage: 3.6V~20V
- ◆ Built-in 90mΩ Power MOSFET
- ◆ <5μA Shutdown Current
- ◆ Oscillation Frequency: 500KHz
- ◆ High efficiency: 90%
- ◆ 2.5A Peak Current Limit Cycle by Cycle
- ◆ Operating Temperature Range: -40°C ~85°C
- ◆ Demo Board Available

APPLICATIONS

- ◆ Power source for portable communication equipment, cameras, video instruments such as VCRs, camcorders.
- ◆ Power source for battery-powered equipment.
- ◆ Power source for household electrical appliance

TYPICAL APPLICATION



ORDERING INFORMATION

LC2319 1 2 3

Code	Description
1	Temperature & RoHS: C: -40~85°C, Pb Free RoHS Std.
2	Package Type: D8: SOP-8
3	Packing Type: TR: Tape & Reel (Standard)

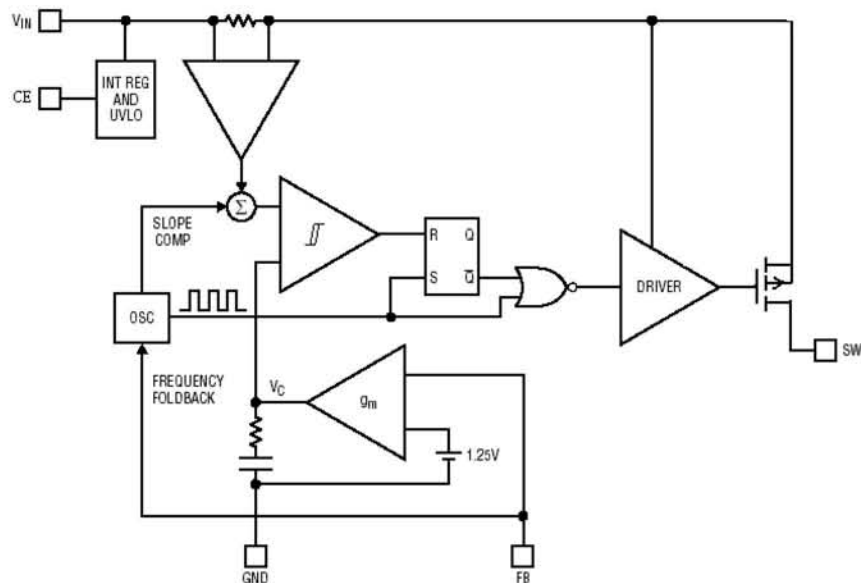
PIN CONFIGURATION

Product Classification		LC2319CD8TR																
Marking		<table border="1"> <tr> <td>8</td> <td>7</td> <td>6</td> <td>5</td> </tr> <tr> <td colspan="4" style="text-align: center;">HGXX</td> </tr> <tr> <td colspan="4" style="text-align: center;">● YYBZZ</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	8	7	6	5	HGXX				● YYBZZ				1	2	3	4
8	7		6	5														
HGXX																		
● YYBZZ																		
1	2		3	4														
HG XX YYBZZ	HG: Product Code																	
	XX: Output Voltage Adjustable																	
	YY: LOT NO.																	
	B: FAB Code																	
ZZ: Date Code																		

PIN DESCRIPTION

Pin No.	Symbol	Description
1	NC	Not Connected
2	VIN	Power Supply Pin
3	SW	Switching Node: PWM output connection to inductor.
4	GND	Ground Pin
5	FB	Pin for Feedback Voltage
6	NC	Not Connected
7	CE	Chip Enable Pin (Active with "H")
8	NC	Not Connected

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

Supply Voltage	23V
SW Pin Voltage	25V
CE Pin Voltage	-0.3V to Vin+0.3V
FB Pin Voltage	-0.3V to 6V
Operating Ambient Temperature Range	-40°C to 85°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	260°C
Thermal resistance: Θ_{JA}	150°C/W

ELECTRICAL CHARACTERISTICS

(Test condition: Ta=25°C, VIN=12V, unless otherwise noted.)

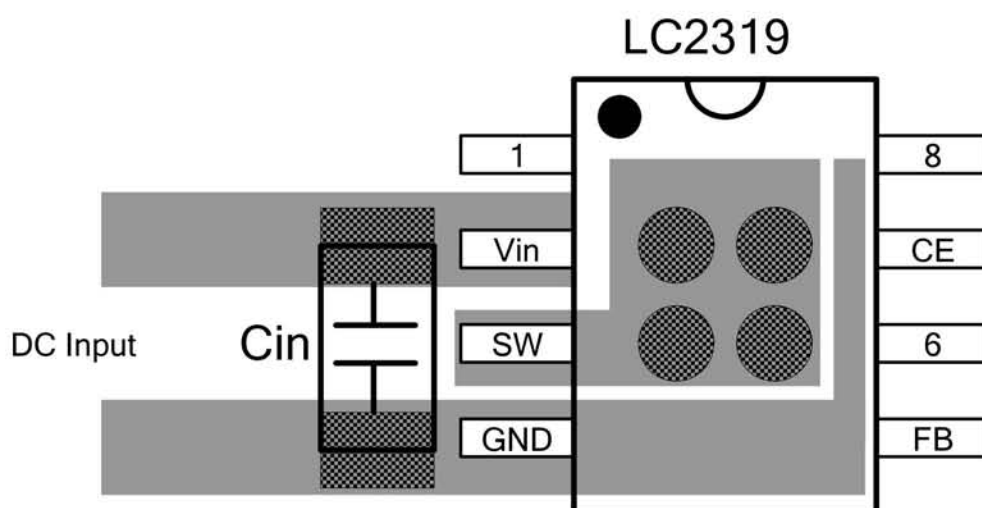
Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
VUVLO	Under Voltage Lockout			3.35	3.6	V
VFB	Feedback Voltage		1.225	1.25	1.275	V
IFB	FB Pin Bias Current	VFB=1.25V		150	600	nA
IQ	Supply Current	VFB=1.3V, VCE=VIN		2		mA
	Quiescent Current in Shutdown	VCE=0V		2	5	uA
$\Delta VFB/\Delta V$	Reference Line Regulation	VIN=5V to 20V		0.08		%/V
$\Delta VFB/\Delta T$	Feedback Voltage Temperature Coefficient	-40°C ≤ Topt ≤ 85°C		±100		ppm/°C
FOSC_MAX	Oscillator Frequency	VFB=1.1V		500		KHz
FOSCTH	Frequency Shift Threshold on FB Pin	FSW=200K		0.44		V
DMAX	Max Duty Cycle			97		%
ILIMIT	Switch Current Limit			2.5		A
Rds_on	Static P-Channel MOSFET On State Resistance			90*		mΩ
ISW	Switch Leakage Current				1	uA
ICEH	CE "H" Input Current	VCE =3V		6.7	15	uA
ICEL	CE "L" Input Current	VCE = 0V		0.03	0.1	uA
VCEH	CE "H" Input Voltage	VIN = 12V	1.8			V
VCEL	CE "L" Input Voltage	VIN = 12V			0.4	V

DEMO BOARD BOM

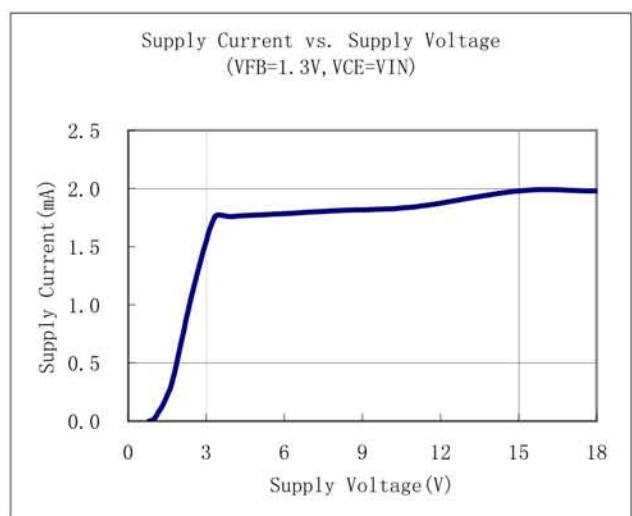
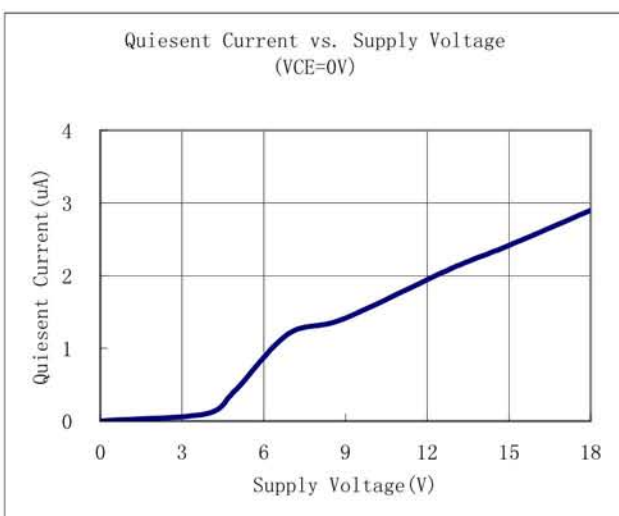
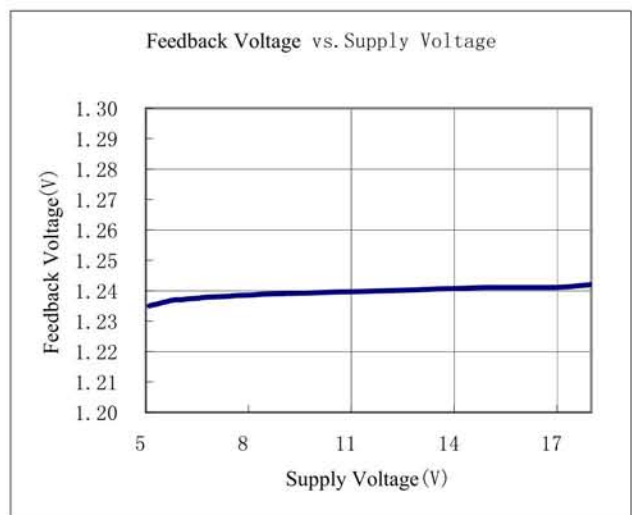
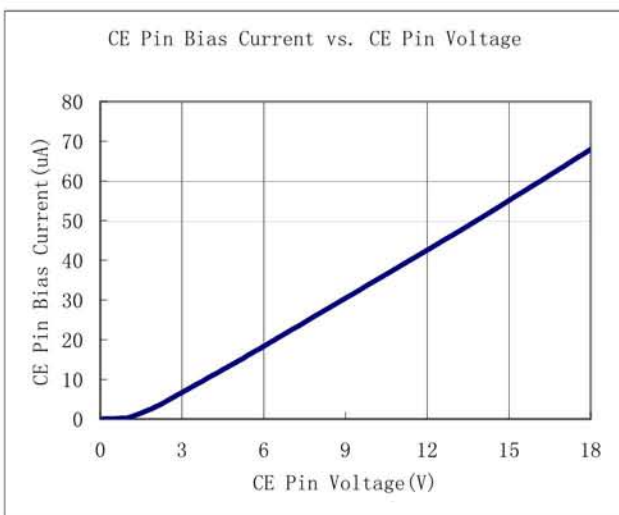
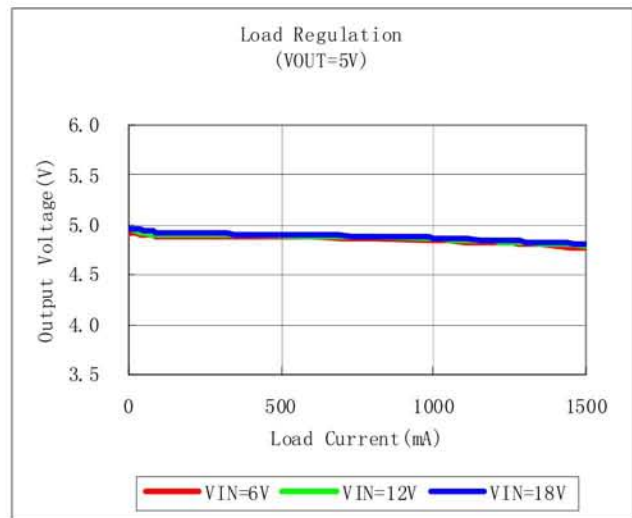
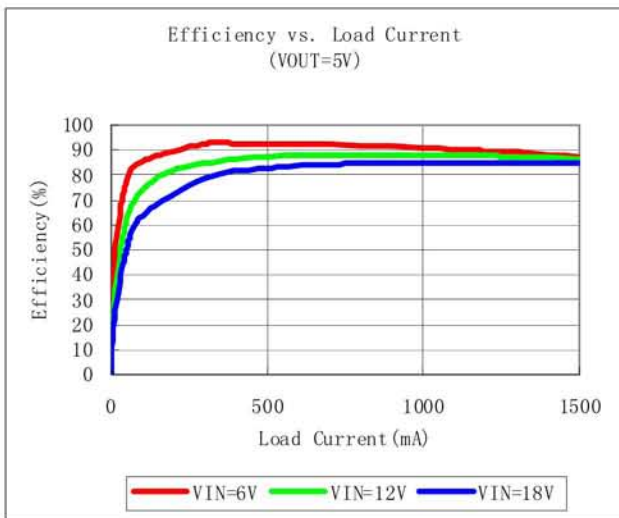
No.	Reference	Type	Specification	Note
1	C1	Capacitor	MLCC 10uF; SMD 0805	
2	C2	Capacitor	MLCC 10uF; SMD 0805	
3	D1	Diode	SS34; 40V, 3A; SMD	
4	L1	Inductor	10uH; 3A; SMD, Shielding	
5	IC1	IC	LC2319; SMD SOP-8	
6	R1	Resistor	SMD 0805; 30K; 1%	
7	R2	Resistor	SMD 0805; 10K; 1%	

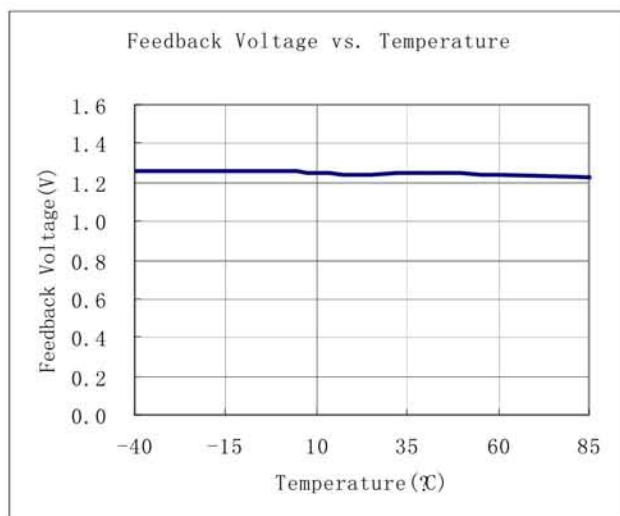
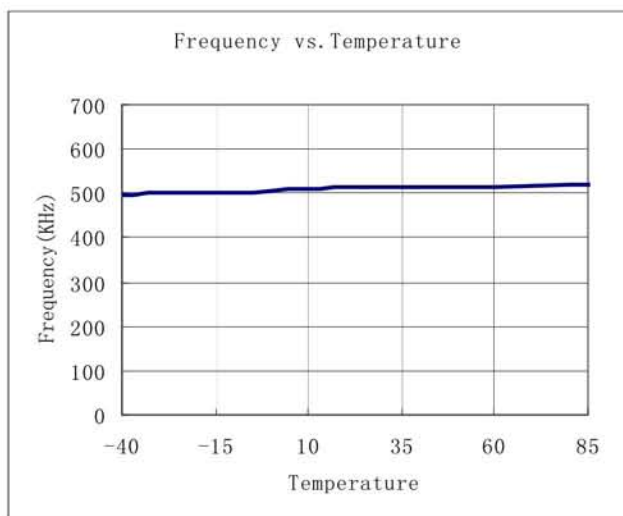
LAYOUT CONSIDERATION

- Careful PCB layout is critical to achieving low switching losses and clean, stable operation. The switching power stage requires particular attention. If possible, mount all the power components on one side of the board, with their ground terminals as close to one another as possible.
- Keep the high-current paths short, especially the distance between Cin and the Vin (GND) terminals. It is essential for stable, jitter-free operation, showing as the following figure. The ESR of Cin should be smaller enough and the capacitance of Cin should be large enough for filtering the switching noise across power path, a 10uF ceramic capacitor is recommended.
- Keep the trace connecting to SW terminal wide enough for heat dissipation, if possible, it is better to place some vias connected to the bottom copper for enhancement.
- Route high-speed switching nodes, for example SW terminal, away from sensitive analog trace (eg. FB terminal).

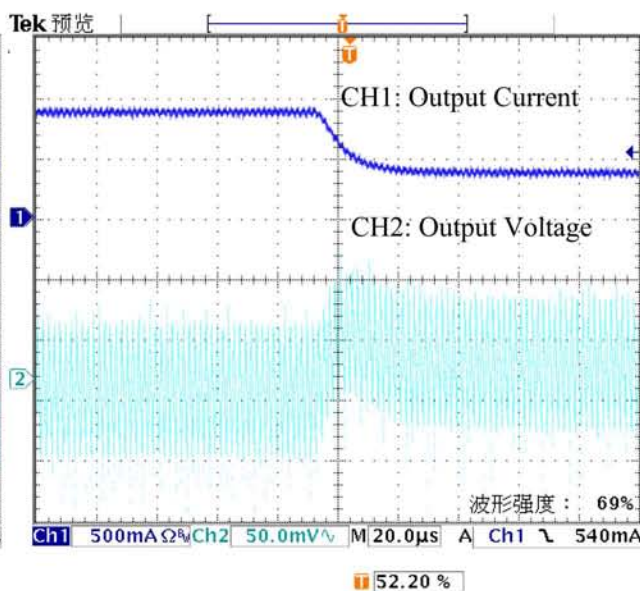
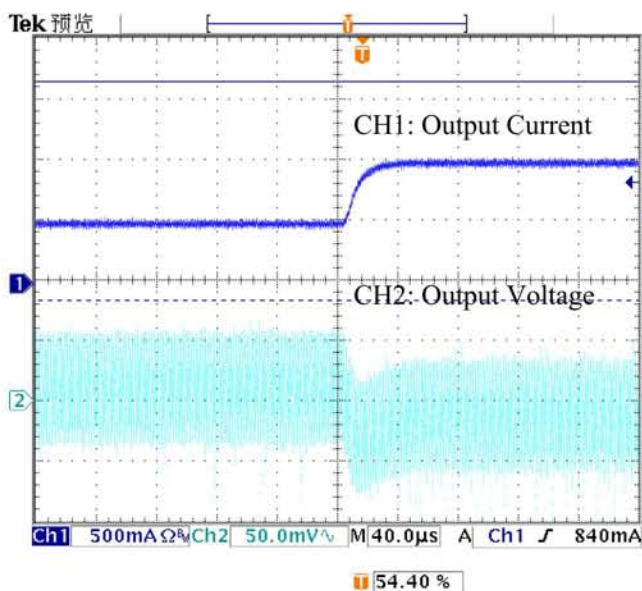


DEMO BOARD MEASUREMENT





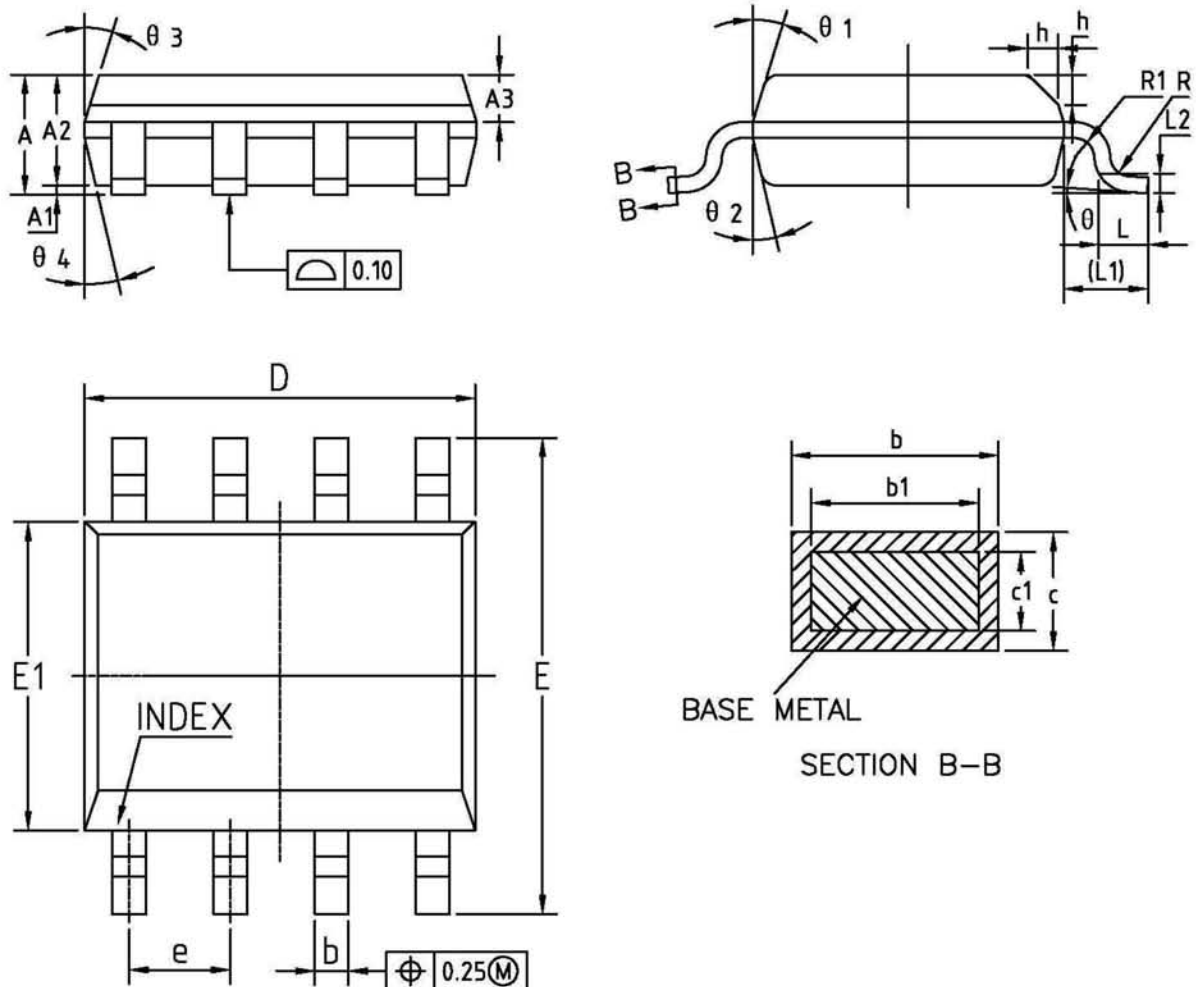
Transient Loading Response



PACKAGE LINE

Package	SOP-8	Devices per reel	2500Pcs	Unit	mm
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Package specification:



Sym)ol	Dimension (mm)			Sym)ol	Dimension (mm)		
	MIN	NOM	MAX		MIN	NOM	MAX
A	-	-	1.77	D	4.7	4.9	5.1
A1	0.08	0.18	0.28	E	5.8	6	6.2
A2	1.2	1.4	1.6	E1	3.7	3.9	4.1
A3	0.55	0.65	0.75	e	1.27BSC		
)	0.39	-	0.48	L	0.5	0.65	0.8
)1	0.38	0.41	0.43	L1	1.05BSC		
c	0.21	-	0.26	θ	0	-	8°