

Low BOM Cost Power Switch

Features

- Internal 600V Power MOSFET
- Current Mode Control
- Green Mode Control
- 45KHz Switching Frequency
- Frequency Jittering
- Standby Power <0.15W
- Over Load Protection
- VCC Over Voltage Protection
- Internal Over Temperature Protection
- Adjustable Output voltage
- SOP-7/DIP-7 and SOP-8/DIP-8 Package

Description

The GR8903 is a highly integrated, current mode power switch with green mode control for low BOM cost buck and flyback application. It provides functions of low standby power consumption (<0.15W), green- mode power-saving operation for green design. The specific adjustable output voltage function provides the feasibility for wider output application. The integrated functions of VCC OVP, OLP, and internal OTP prevent the circuit being damaged from the abnormal conditions. It minimizes the components counts and is available in SOP-7/DIP-7 and SOP-8/DIP-8 package. Those make it an ideal design for low cost application.

Application

- Home Appliance

Application Information

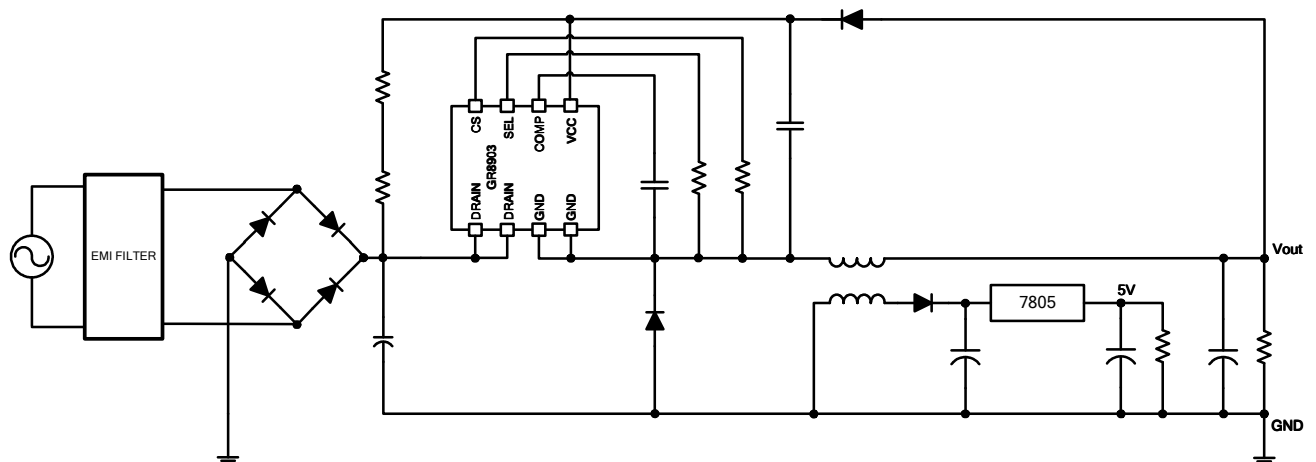
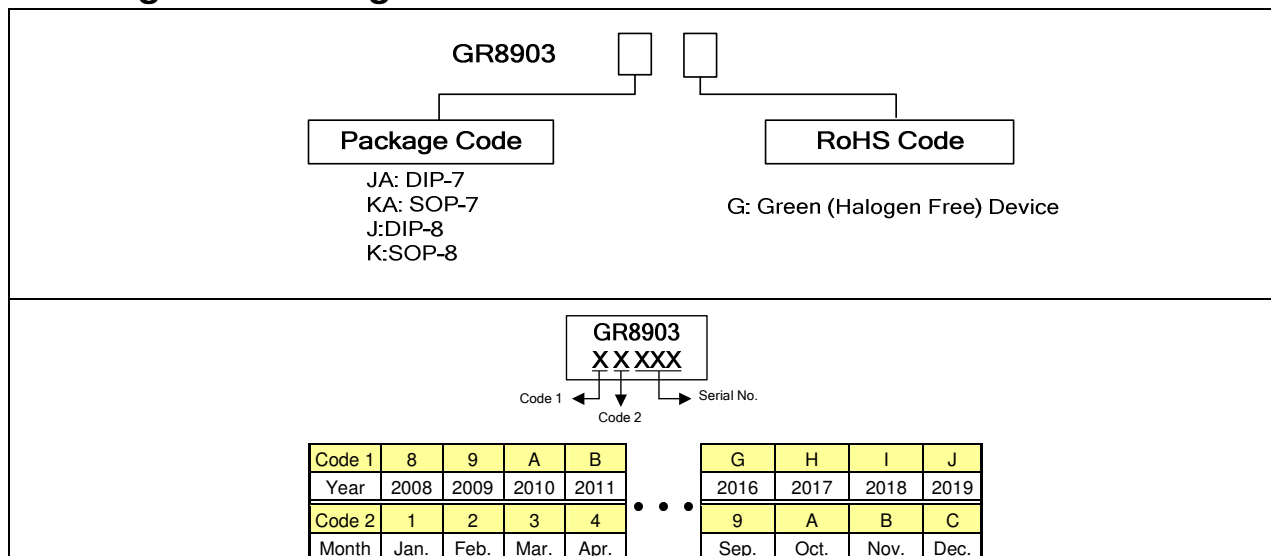


Fig1. GR8903

Ordering and Marking Information

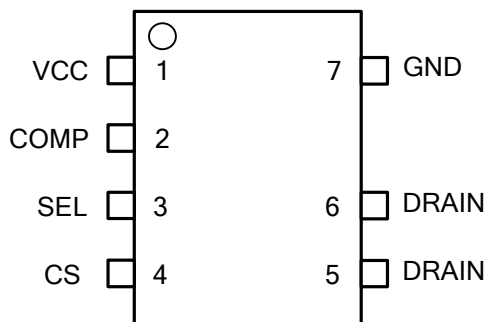


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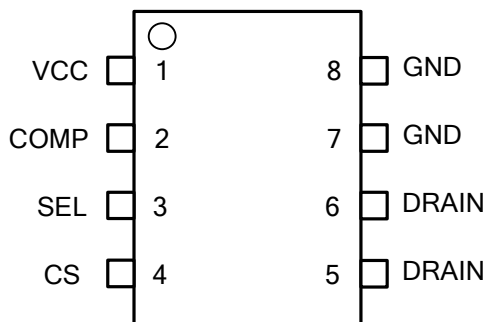
Pin Configuration

TOP VIEW

SOP-7/DIP-7



SOP-8/DIP-8



Pin Description

Pin No.		Name	Function
SOP-7/DIP-7	SOP-8/DIP-8		
1	1	VCC	Power supply pin
2	2	COMP	Voltage Feedback pin
3	3	SEL	Output Voltage Select pin. The output voltage will be 18V as the SEL pin is floating. The output voltage will be 12V as the SEL pin is connected to GND directly. And the output voltage will be 24V as the SEL is connected to GND with a 20kΩ resistor.
4	4	CS	Current sense pin, connect to sense the power MOS current
5,6	5,6	DRAIN	Drain of internal HV MOSFET
7	7,8	GND	Ground

Absolute Maximum Ratings

Supply Voltage VCC	-----	30V
COMP, SEL, CS	-----	-0.3 ~ 7V
DRAIN Voltage	-----	-0.3~600V
Junction Temperature	-----	150°C
Operating Ambient Temperature	-----	-20°C to 85°C
Storage Temperature Range	-----	-65°C to 150°C
Lead Temperature (Soldering,10sec)	-----	260°C
ESD Voltage Protection, Human Body Model (Exclude Drain pin)	-----	2.0 kV
ESD Voltage Protection, Machine Model	-----	200 V

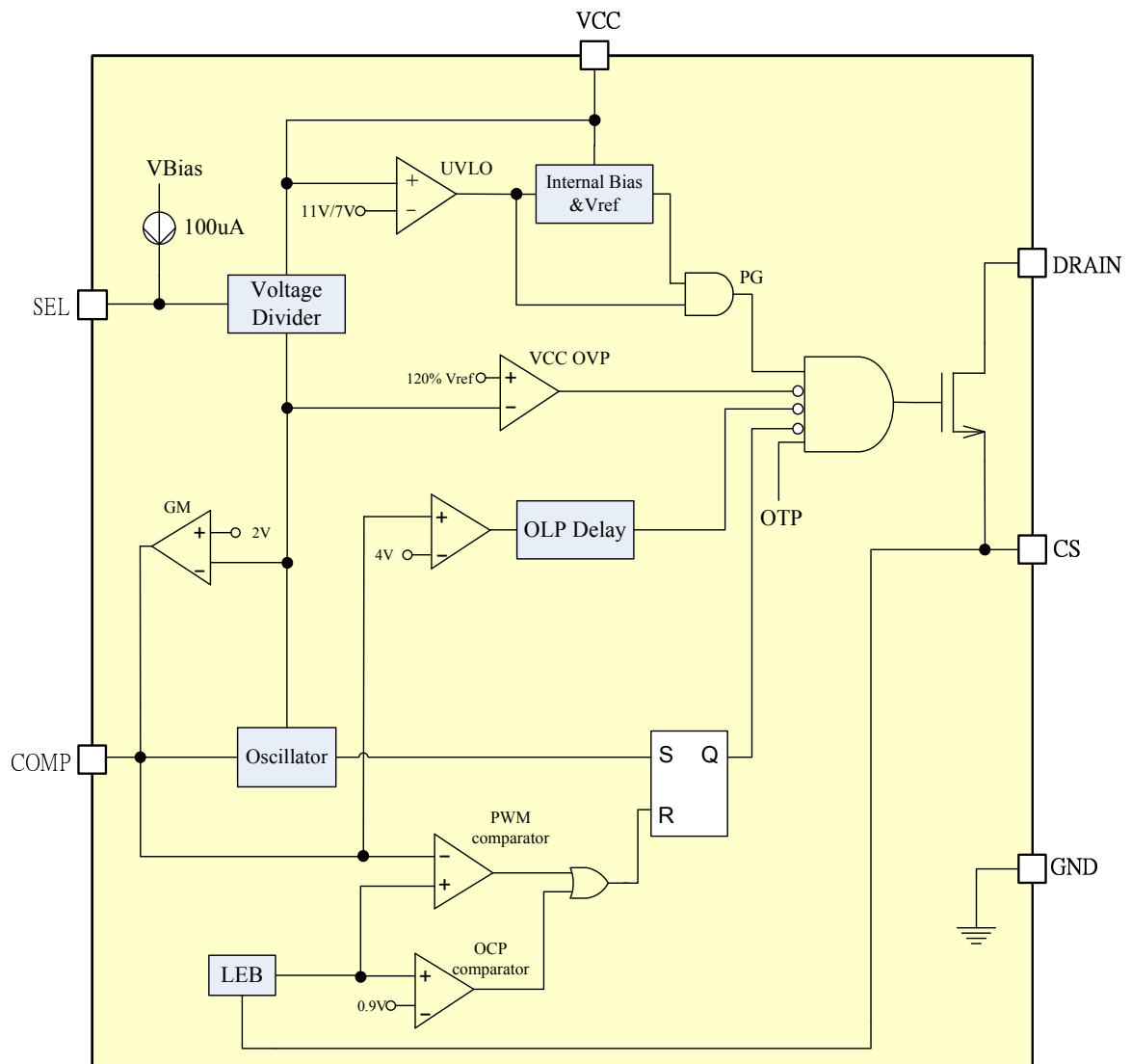
Recommended Operating Conditions

Item	Min	Max	Unit
Supply voltage VCC	7	25	V
VCC capacitor	4.7	10	uF
COMP pin capacitor	0.022	0.1	uF

R _{SEL}	Output Voltage
0Ω	12V
Floating	18V
20kΩ	24V



Block Diagram



**Electrical Characteristics** (VCC = 15V & TA = 25°C, unless otherwise specified.)

Parameter	Test Conditions	Min	Typ	Max	Unit
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VCC SECTION

Start-Up Current	VCC<UVLO on		8	15	μA
Operating Current	Vcomp=0V		0.5		mA
	Vcomp=2.5V		2		mA
	Protection tripped (OVP, OLP, OCP)		0.7		mA
On Threshold Voltage		10.5	11.0	11.5	V
Off Threshold Voltage		6.5	7.0	7.5	V
VCC OVP	120% VCC Level	115	120	125	%
	De-bounce Time		100		μs

OSCILLATOR SECTION

Switching Frequency	VCC=18V		45		KHz
Frequency Jittering			±6		%
Minimum Frequency	VCC=20V		500		Hz
Voltage stability (VCC=12~25V)				3	%

SEL

I _{SEL}			100		μA
De-bounce time			100		μs

CURRENT-SENSE SECTION

Input Impedance		1			MΩ
Peak Current Limitation		0.85	0.9	0.95	V
Leading Edge Blanking			250		ns
Delay to Output			100		ns
Max On time		16	20	24	μs

ERROR AMPLIFIER (COMP pin)

Reference Voltage			2		V
Trans-conductance			150		μmho
Output Sink Current			15.0		μA
Output Source Current			-15.0		μA
Output Clamp Voltage				5.5	V
OLP triple level			4		V
OLP delay time			60		ms

MOSFET SECTION(GR8903)

BVdss		600			V
Rds(on)			9.3		Ω

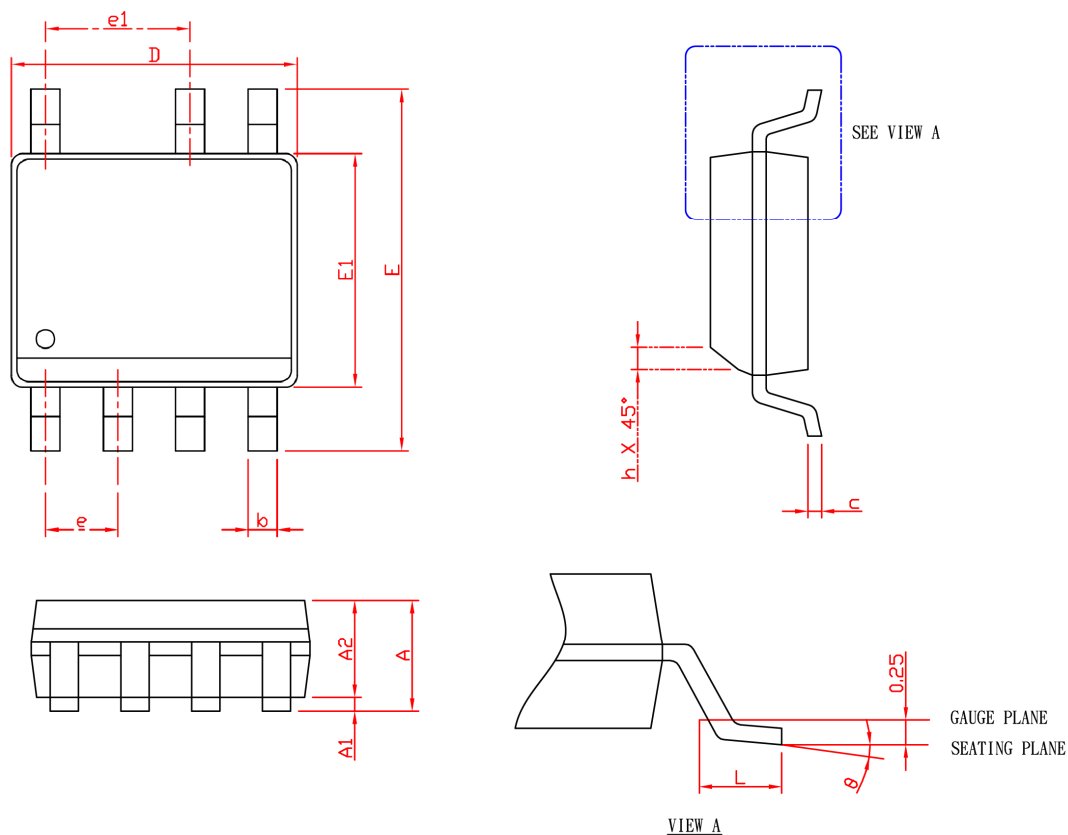
ON-CHIP OVER TEMPERATURE PROTECTION

OTP Triple level			150		°C
	Hysteresis		30		°C



Package Information

SOP-7

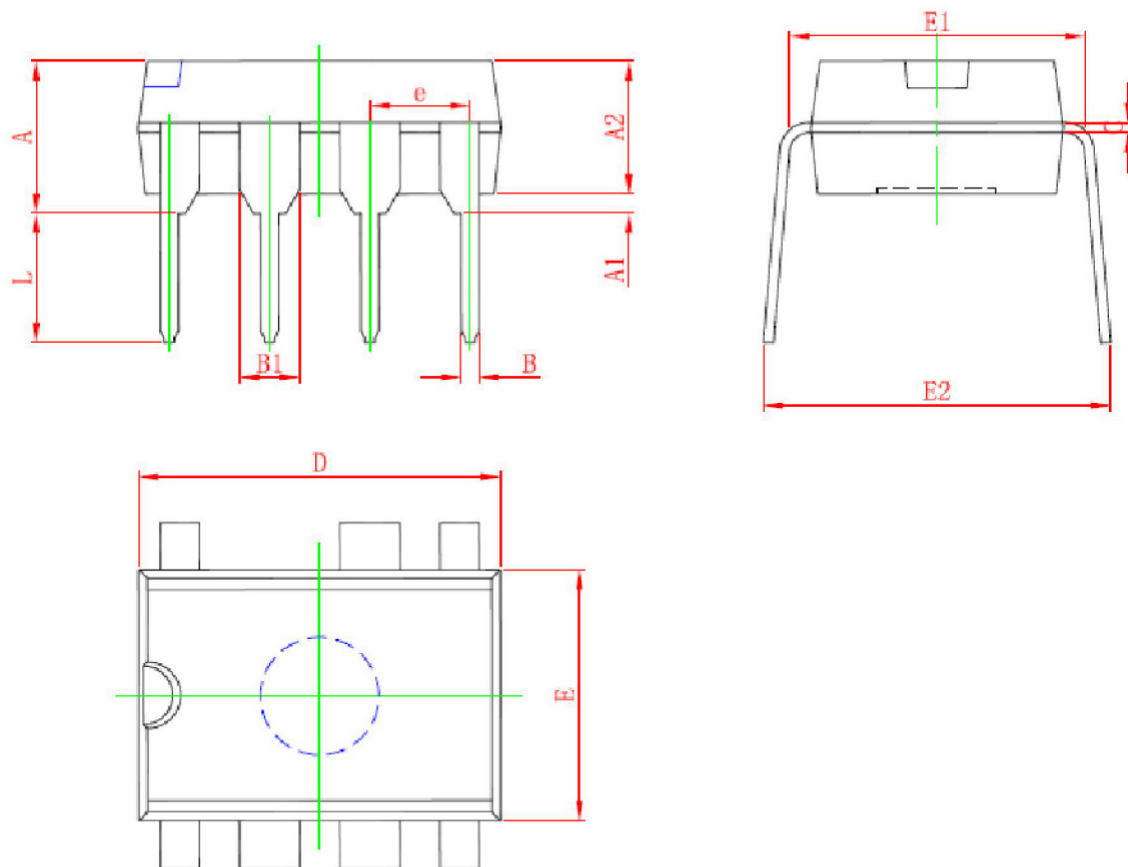


SYMBOL	SOP-7			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
e1	2.54 BSC		0.101 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

Note: 1. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

2. Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

DIP-7

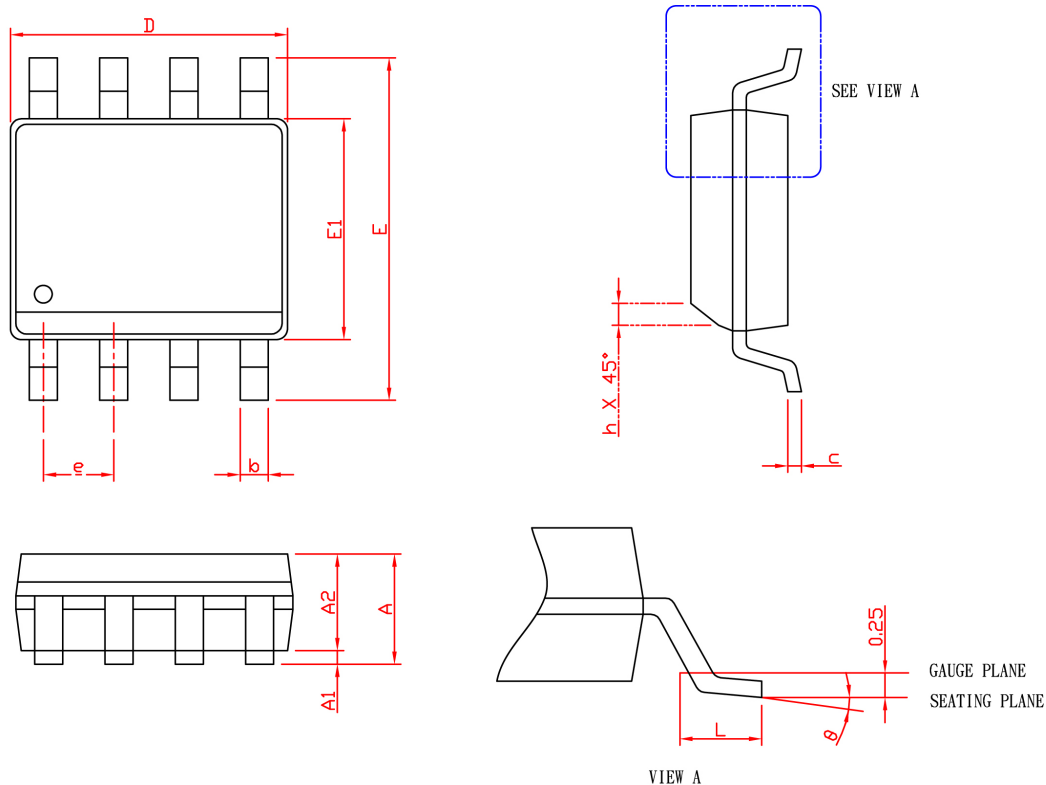


SYMBOL	DIP-7			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	4.95	0.115	0.195
B	0.36	0.56	0.014	0.022
B1	1.14	1.78	0.045	0.070
C	0.204	0.36	0.008	0.014
D	9.01	10.16	0.355	0.400
E	6.10	7.11	0.240	0.280
E1	7.62	8.26	0.300	0.325
E2		10.92		0.430
e	2.54 BSC		0.100 BSC	
L	2.92	3.81	0.115	0.150

Note: 1. Followed from JEDEC MS-001.

2. Dimension D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 10 mil.

SOP-8

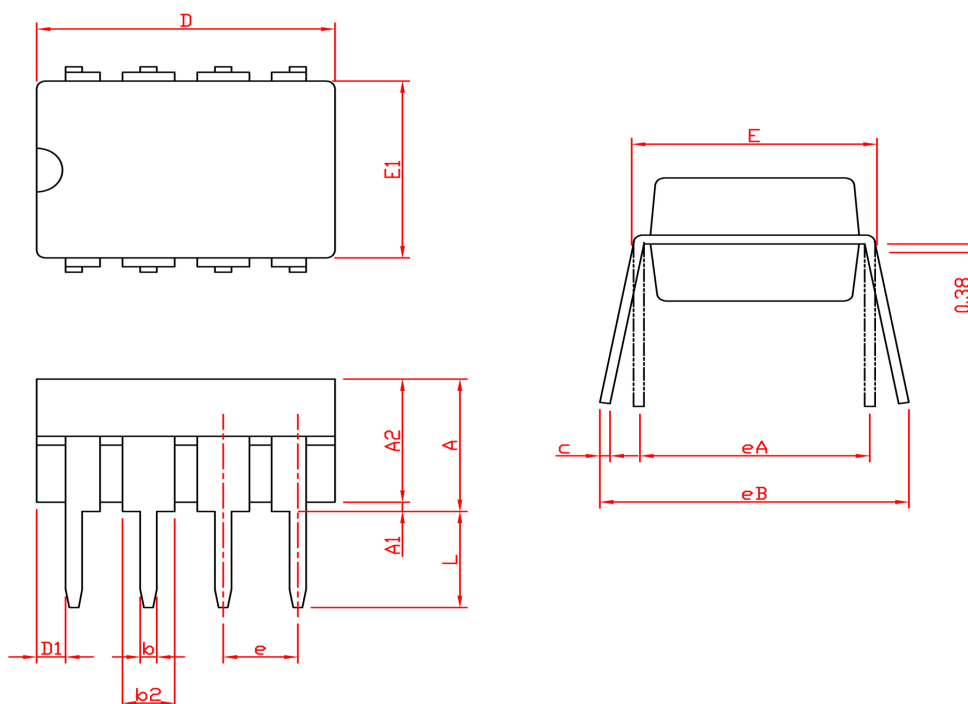


SYMBOL	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

Note: 1. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side.

2. Dimension "E" does not include inter-lead flash or protrusions. Inter-lead flash and protrusions shall not exceed 10 mil per side.

DIP-8



SYMBOL	DIP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	4.95	0.115	0.195
b	0.36	0.56	0.014	0.022
b2	1.14	1.78	0.045	0.070
c	0.20	0.35	0.008	0.014
D	9.01	10.16	0.355	0.400
D1	0.13		0.005	
E	7.62	8.26	0.300	0.325
E1	6.10	7.11	0.240	0.280
e	2.54 BSC		0.100 BSC	
eA	7.62 BSC		0.300 BSC	
eB		10.92		0.430
L	2.92	3.81	0.115	0.150

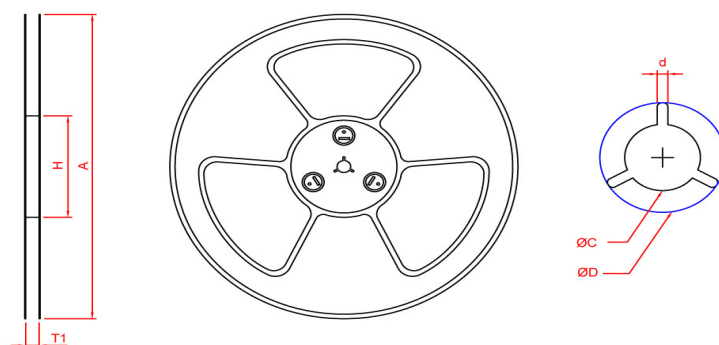
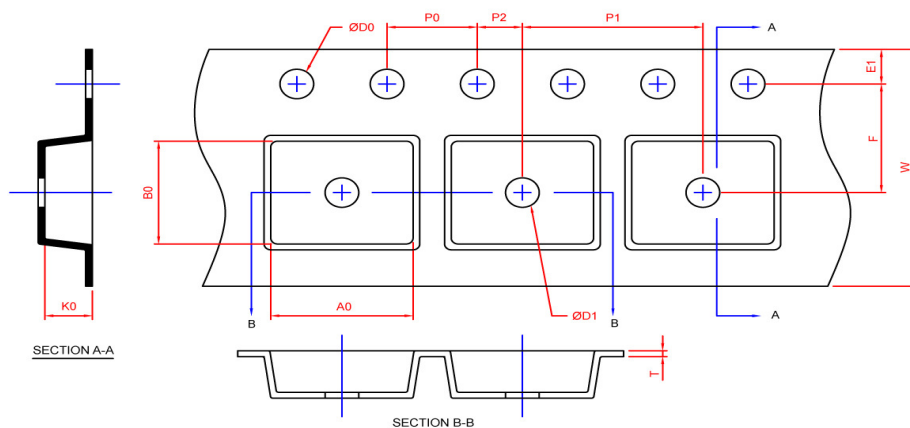
Note: 1. Followed from JEDEC MS-001 BA.

2. Dimension D, D1 and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 10 mil.



Carrier Tape & Reel Dimensions

SOP- 7 & SOP-8



Application	A	H	T1	C	d	D	W	E1	F
SOP- 7 & SOP-8	330.0±2.0	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	8.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	6.40±0.20	5.20±0.20	2.10±0.20

(mm)

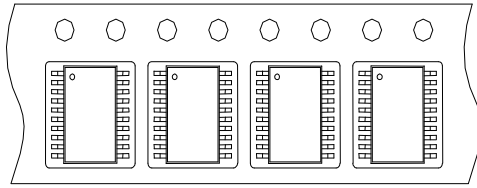
Devices Per Unit

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 7 & SOP-8	12	-	2500

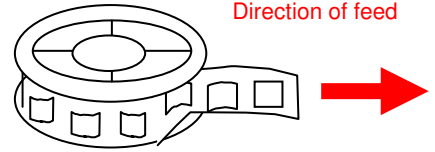


Tape and Specification Reel

SOP-7 & SOP-8



Direction of feed



Direction of feed



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