Dual-Channel, 3.3V/500mA and 1.8V/300mA Linear Regulator

Features

- Fixed Output Voltage :
  V_{OUT1}=3.3V/500mA
  V_{OUT2}=1.8V/300mA
- Low Dropout Voltage (defined as the minimum input/output voltage difference):
  Output 1 Dropout Voltage : 0.6V (at 500mA)
  Output 2 Dropout Voltage : 0.9V (at 300mA)
- Stable with 4.7uF Output Capacitor(at V_{OUT1})
  Stable with 2.2uF Output Capacitor(at V_{OUT2})
- Built in Thermal Protection
- Built in Current Limit Protection
- Fast transient Response
- Short Setting Time
- SOP-8 and SOP-8-P Package Available

Applications

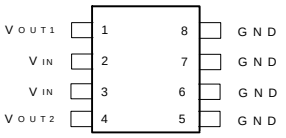
- Desktop Computer
- Networking Systems
- Optical Data Storage Systems

General Description

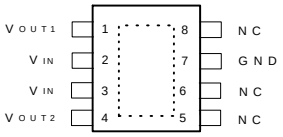
The APL5523 is a dual low dropout regulator with output1 with 3.3V/0.5A and output2 with 1.8V/0.3A output capability. In order to obtain lower dropout voltage and faster transient response, which is critical for low voltage applications, the APL5223 has been optimized. The dropout voltages are guaranteed at 0.6V at 0.5A for output1 and 0.9V at 0.3A for output 2. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload that would create excessive junction temperatures. The APL5523 regulator comes in a SOP-8 and SOP-8-P package.

Pin Configuration

SOP–8 (Top View)



SOP-8-P (Top View)



= Thermal Pad
(connected to GND plane for better heat dissipation)

Ordering and Marking Information

APL5523 □□-□□□

- Lead Free Code
- Handling Code
- Temp. Range
- Package Code

Package Code
K : SOP-8 KA : SOP-8-P
Operating Junction Temp. Range
C : 0 to 150°C
Handling Code
TU : Tube TR : Tape & Reel
Lead Free Code
L : Lead Free Device Blank : Original Device

APL5523 K/KA :

APL5523
XXXXX

XXXXX - Date Code

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

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Rev. A.1 - July., 2004

Pin Description

PIN		I/O	Description
No.	Name		
1	V_{OUT1}	O	V_{OUT1} output Voltage 3.3V. sources up to 500 mA.
2	V_{IN}	I	Supply Voltage.
3	V_{IN}	I	Supply Voltage.
4	V_{OUT2}	O	V_{OUT2} output Voltage 1.8V. sources up to 300 mA.
5	GND		Ground also functions as a heatsink. Solder to the ground plane to maximize thermal dissipation
6	GND		
7	GND		
8	GND		

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}, V_{OUT}	Input Voltage or Out Voltage	6	V
$R_{TH,JA}$	Thermal Resistance – Junction to Ambient SOP-8 SOP-8-P	 150 75	°C/W
$R_{TH,JC}$	Thermal Resistance – Junction to Case SOP-8 SOP-8-P	 30 5	°C/W
PD	Power Dissipation	Internally Limited	W
TJ	Operating Junction Temperature Control Section Power Transistor	 0 to 125 0 to 150	°C
TSTG	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature (Soldering, 10 second)	260	°C

Electrical Characteristics

Unless otherwise noted these specifications apply over full temperature, C_{IN}=1µF, C_{OUT1}=4.7µF, C_{OUT2}=2.2µF, T_J=0 to 125°C. Typical values refer to T_J=25°C.

Symbol	Parameter	Test Conditions	APL5523			Unit
			Min.	Typ.	Max.	
V_{IN}	Input Voltage		2.7		6	V
I_{SHORT}	Short Current	V_{OUT}=0V		50		mA
OTS	Over Temperature Shutdown			150		°C
	Over Temperature Shutdown Hysteresis	Hysteresis		20		°C
TC	Output Voltage Temperature Coefficient			100		ppm/°C
I_Q	Quiescent Current	I_{OUT1}=500mA, I_{OUT2}=300mA		900	1000	µA
		I_{OUT1}=0mA, I_{OUT2}=0mA		100	200	

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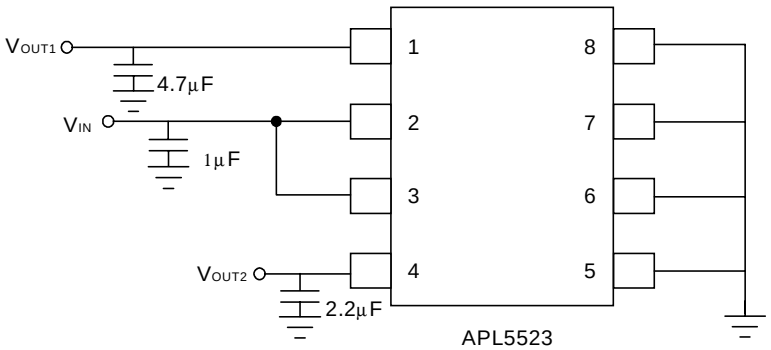
Electrical Characteristics (Cont.)

Unless otherwise noted these specifications apply over full temperature, C_{IN}=1µF, C_{OUT1}=4.7µF, C_{OUT2}=2.2µF, T_J=0 to 125°C. Typical values refer to T_J=25°C.

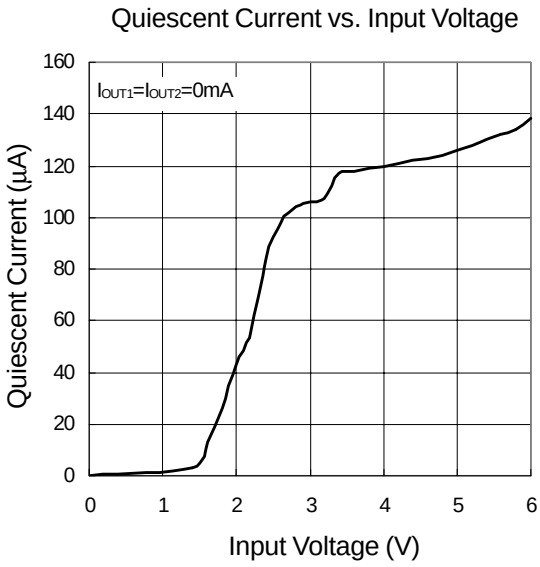
Symbol	Parameter	Test Conditions	APL5523			Unit
			Min.	Typ.	Max.	
Output1 (500mA)						
V_{OUT}	Output Voltage	V_{IN}=5V	V_{OUT} -2%	3.3	V_{OUT} +2%	V
I_{LIMIT}	Circuit Current Limit	V_{IN}=V_{OUT}+1V		900		mA
I_{OUT}	Load Current	V_{IN}=V_{OUT}+1V	500			mA
REG_{LINE}	Line Regulation	V_{OUT}+1V< V_{CC}<6.0V, I_{OUT}=1mA		5	10	mV
REG_{LOAD}	Load Regulation	V_{IN} =V_{OUT}+1V, 0mA< I_{OUT} < I_{MAX}		40	60	mV
PSRR	Ripple Rejection	F≤1kHz, 1Vpp at I_{OUT}=50mA	40	48		dB
V_{DROP}	Dropout Voltage(Note1)	I_{OUT} =500mA		0.6	0.7	V
C_{OUT}	Output Capacitor			4.7		µF
	ESR		0.01	0.1	1	Ohm
Output2(300mA)						
V_{OUT}	Output Voltage	V_{IN}=5V	V_{OUT} -2%	1.8	V_{OUT} +2%	V
I_{LIMIT}	Circuit Current Limit	V_{IN}=V_{OUT}+1V		900		mA
I_{OUT}	Load Current	V_{IN}=V_{OUT}+1V	300			mA
REG_{LINE}	Line Regulation	V_{OUT}+1V< V_{CC}<6.0V, I_{OUT}=1mA		4	10	mV
REG_{LOAD}	Load Regulation	V_{IN} =V_{OUT}+1V, 0mA< I_{OUT} < I_{MAX}		20	40	mV
PSRR	Ripple Rejection	F≤1kHz, 1Vpp at I_{OUT}=50mA	45	55		dB
V_{DROP}	Dropout Voltage(Note1)	I_{OUT} =300mA		0.9	1	V
C_{OUT}	Output Capacitor			2.2		µF
	ESR		0.01	0.1	1	Ohm

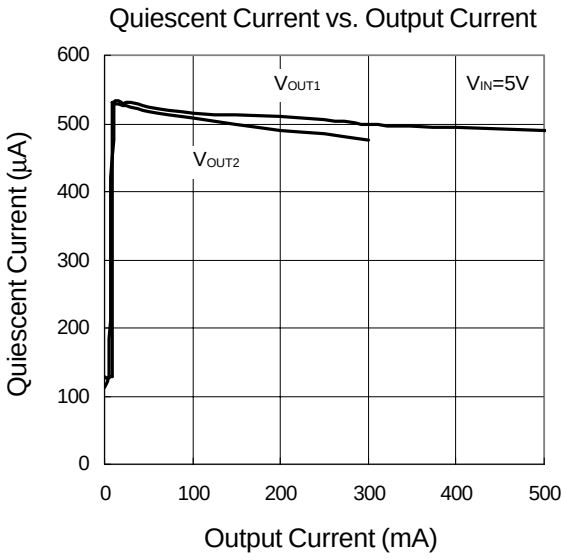
Note1 : Dropout voltage definition : V_{IN}-V_{OUT} when V_{OUT} is 2% below the value of V_{OUT} for V_{IN} = V_{OUT}+1V

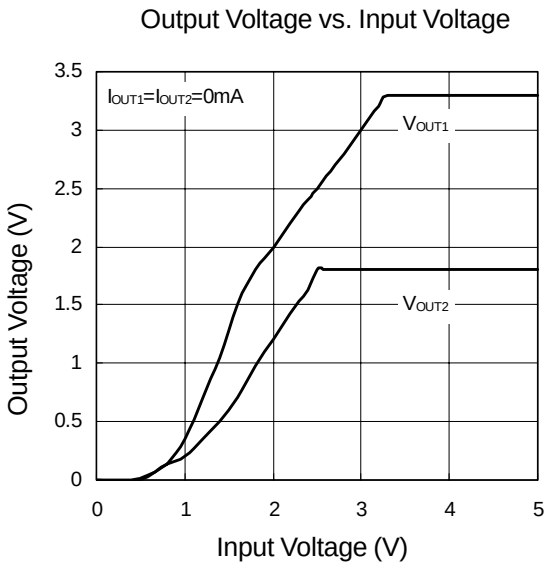
Application Circuit

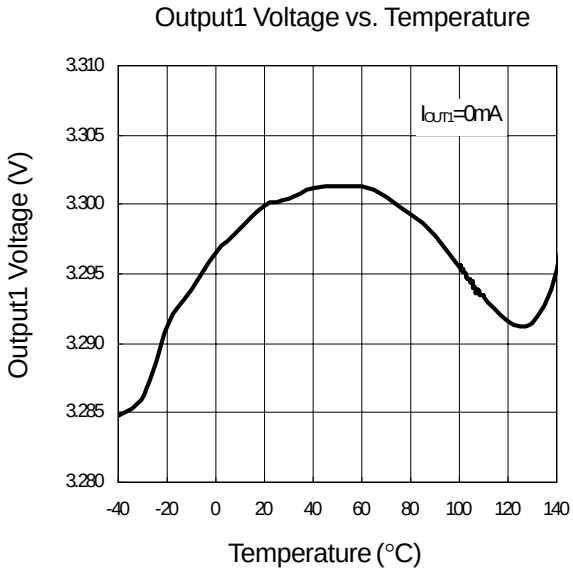


Typical Characteristics



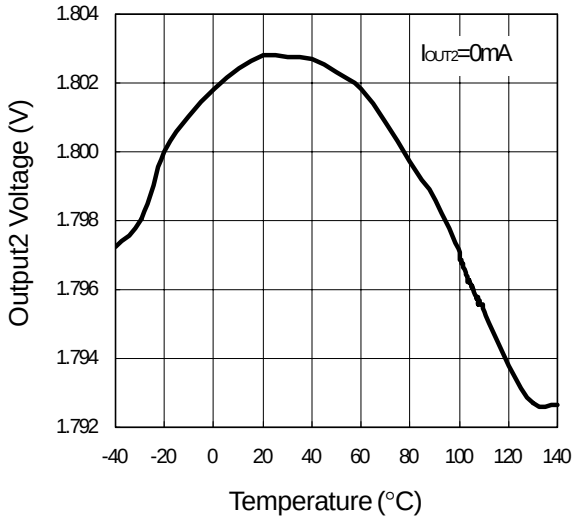




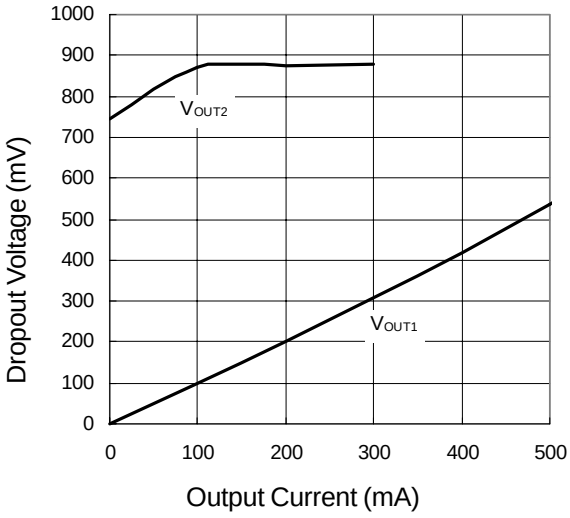


Typical Characteristics

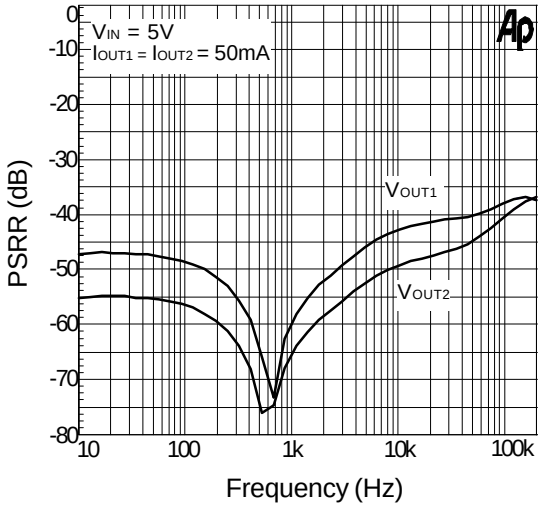
Output2 Voltage vs. Temperature



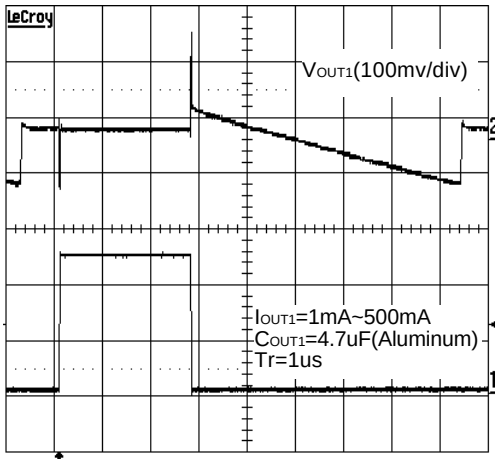
Dropout Voltage vs. Output Current



PSRR vs. Frequency

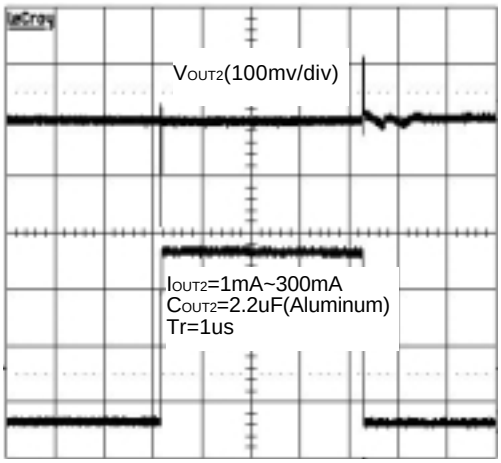


Load-Transient Response



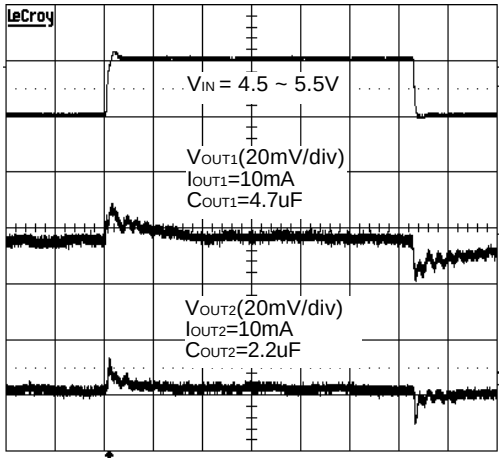
Typical Characteristics

Load-Transient Response



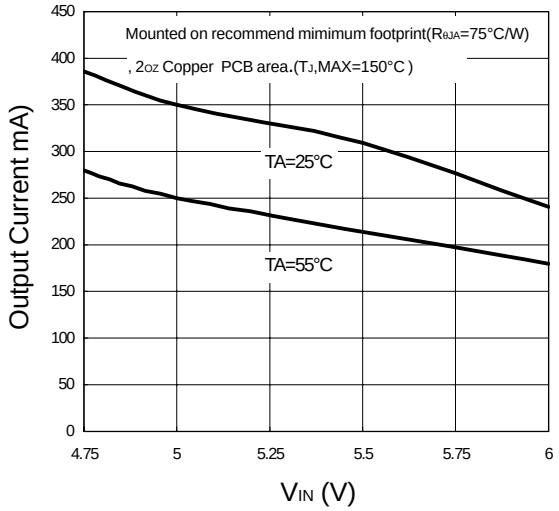
Time(0.1ms/div)

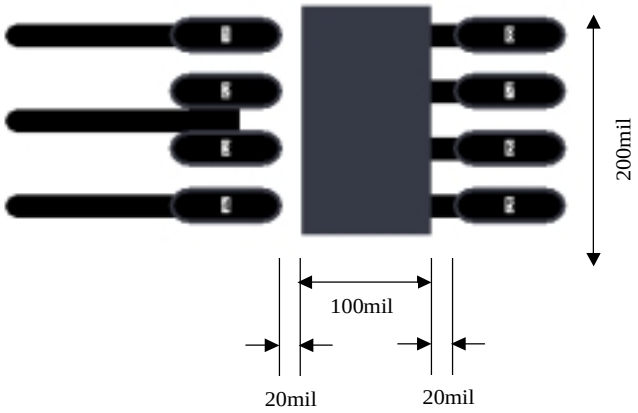
Line-Transient Response



Time(20µs/div)

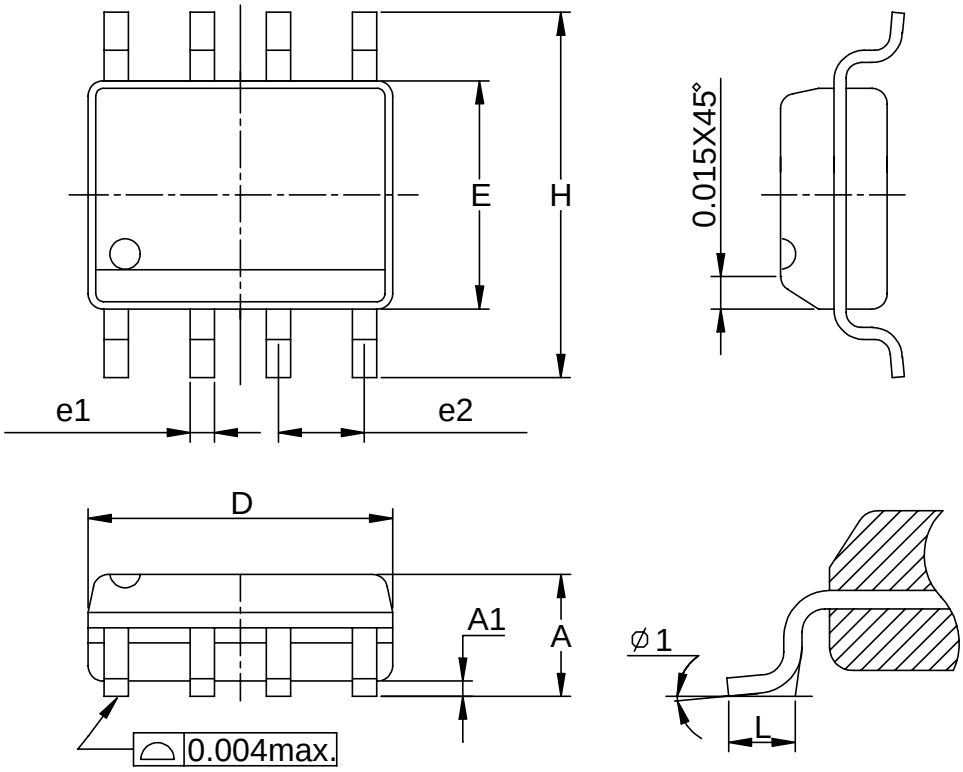
Output Curretn vs. V_{IN}





Packaging Information

SOP-8 pin (Reference JEDEC Registration MS-012)

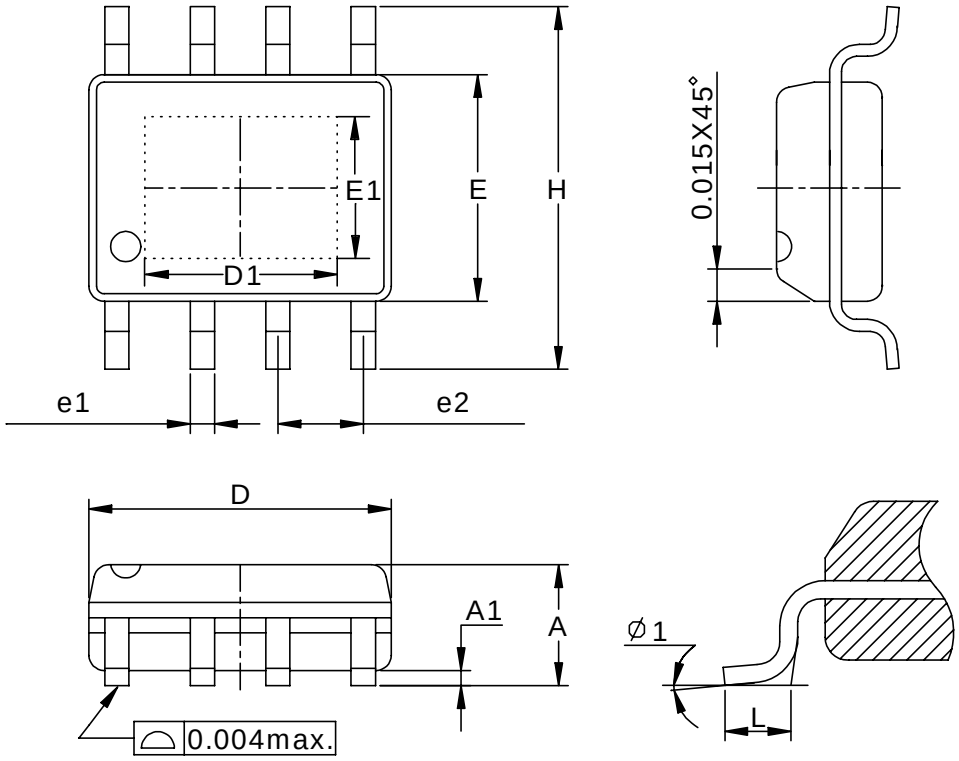


Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
ϕ 1	8°		8°	

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Packaging Information

SOP-8-P pin (Reference JEDEC Registration MS-012)



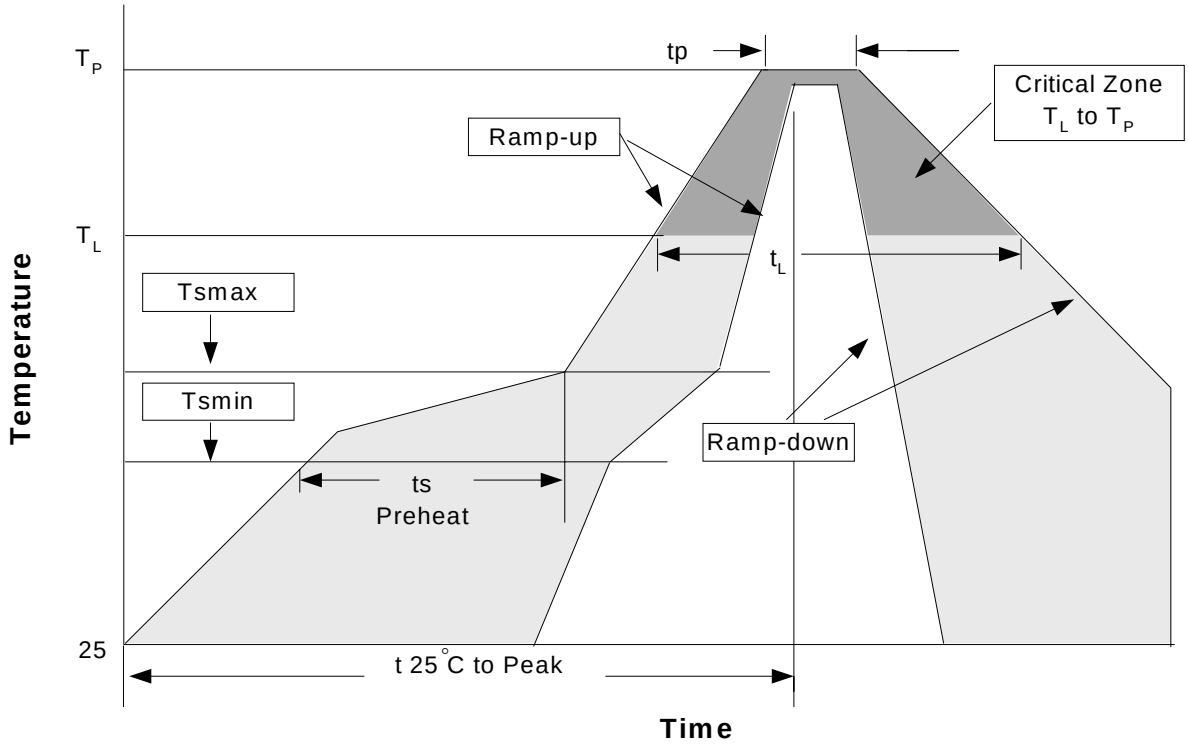
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
D1	3.00REF		0.118REF	
E	3.80	4.00	0.150	0.157
E1	2.60REF		0.102REF	
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
ϕ 1	8°		8°	

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Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classificatin Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to T_P)	3°C/second max.		3°C/second max.	
Preheat - Temperature Min (Tsmin) - Temperature Mix (Tsmax) - Time (min to max)(ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Tsmax to T_L - Ramp-up Rate			3°C/second max	
Tsmax to T_L - Temperature(T_L) - Time (t_L)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak Temperature(Tp)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature(tp)	10-30 seconds	10-30 seconds	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.		6°C/second max.	
Time 25°C to Peak Temperature	6 minutes max.		8 minutes max.	

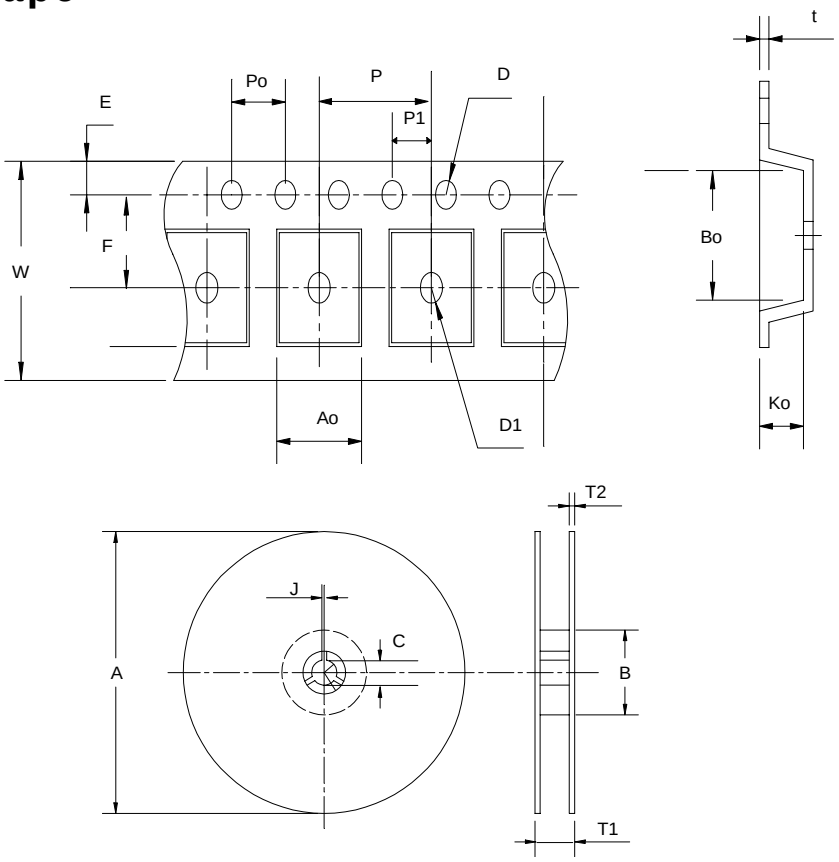
Note: All temperatures refer to topside of the package. Measured on the body surface.

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Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C , 5 SEC
HOLT	MIL-STD-883D-1005.7	1000 Hrs Bias @ 125 °C
PCT	JESD-22-B, A102	168 Hrs, 100 % RH , 121°C
TST	MIL-STD-883D-1011.9	-65°C ~ 150°C, 200 Cycles
ESD	MIL-STD-883D-3015.7	VHBM > 2KV, VMM > 200V
Latch-Up	JESD 78	10ms , I_{tr} > 100mA

Carrier Tape



Application	A	B	C	J	T1	T2	W	P	E
SOP-8/P	330±1	62 ± 1.5	12.75 + 0.1 5	2 + 0.5	12.4 +0.2	2± 0.2	12 + 0.3 - 0.1	8± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5 ± 0.1	1.55±0.1	1.55+ 0.25	4.0 ± 0.1	2.0 ± 0.1	6.4 ± 0.1	5.2± 0.1	2.1± 0.1	0.3±0.013

(mm)

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Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 8/P	12	9.3	2500

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