

# APC558



## Dual Operational Amplifier

### Features

- Power Supply Range :
  - Signal Supply : 3V to 20V
  - Dual Supply :  $\pm 1.5V$  to  $\pm 10V$
- Large DC Voltage Gain : 100dB
- Large Output Swing :  $0V \sim V_{DD} - 1.5V$
- Bandwidth(unity gain) : 2MHz
- Internally Frequency Compensated for Unity Gain
- Low Input Offset Voltage : 1mV

### General Description

The APC558 consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply up to 20 volts. Operation from dual power supplies is also possible and the power supply current drain is essentially independent of the magnitude of the power supply voltage.

Application areas include transducer amplifiers, DC gain blocks and all the conventional OP amplifier circuits which can be more easily implemented in single power supply systems. (For example, the APC558 can be directly operated from the standard +5V power supply voltage which is normally used in digital systems.)

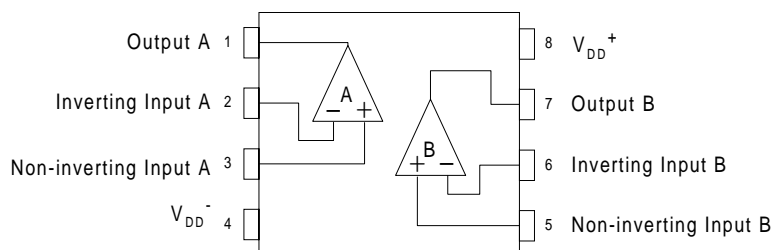
### Applications

- Amplifiers
- Filters
- Analog Circuit

### Ordering and Marking Information

APC558 	Package Code J : PDIP                      K : SOP-8 O : TSSOP-8 Temp. Range C : 0 to 70°C Handling Code TU : Tube                      TR : Tape & Reel Lead Free Code L : Lead Free Device      Blank : Original Device
APC558 J :	XXXXX - Date Code
APC558 K/O :	XXXXX - Date Code

## Block Diagram



## Absolute Maximum Ratings $T_A = 25^\circ\text{C}$

Symbol	Parameter	Rating	Unit
$V_{DD}$	Supply Voltage	20	V
$V_{ID}$	Differential Input Voltage	20	V
$V_I$	Input Voltage	-0.3V to +20V	V
$P_D$	Power Dissipation	500	mW
$T_A$	Operating Free-air Temperature Range	0 to 70	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-40 to +150	$^\circ\text{C}$

## Electrical Characteristics $V_{DD} = \pm 10\text{V}$ , $T_A = 25^\circ\text{C}$

Symbol	Parameter	Test Conditions	APC558			Unit
			Min.	Typ.	Max.	
$V_{IO}$	Input Offset Voltage	$R_S \leq 10\text{k}\Omega$		1	3	mV
$I_{IO}$	Input Offset Current			2	10	nA
$I_{BIAS}$	Input Bias Current			25	70	nA
$R_{IN}$	Input Resistance		0.3	5		$\text{M}\Omega$
$A_V$	Large Signal Voltage Gain	$R_L \geq 2\text{k}\Omega$ , $V_O = \pm 10\text{V}$	86	100		dB
$V_{OM1}$	Maximum Output Voltage Swing 1	$R_L \geq 10\text{k}\Omega$	$\pm 9$	$\pm 9.5$		V
$V_{OM2}$	Maximum Output Voltage Swing 2	$R_L \geq 2\text{k}\Omega$	$\pm 8.5$	$\pm 9.0$		V
$V_{ICM}$	Input Common-mode Voltage Range		$\pm 9$	$\pm 9.5$		V
CMRR	Common-mode Rejection Ratio	$R_S \leq 10\text{k}\Omega$		90		dB
SVRR	Supply Voltage Rejection Ratio	$R_S \leq 10\text{k}\Omega$ , $V_{P-P} = 100\text{mV}$ , $f_{IN} = 100\text{Hz}$	60	65		dB
$I_{CC}$	Operating Current			3.7	6	mA
$V_{NI}$	Equivalent Input Noise Voltage	RIAA, $R_S = 1\text{k}\Omega$ , 30kHz, LPF		1.4		$\mu\text{Vrms}$
SR	Slew Rate			650		$\text{mV}/\mu\text{s}$
GBWP	Gain Bandwidth Product			2		MHz

## Typical Characteristics

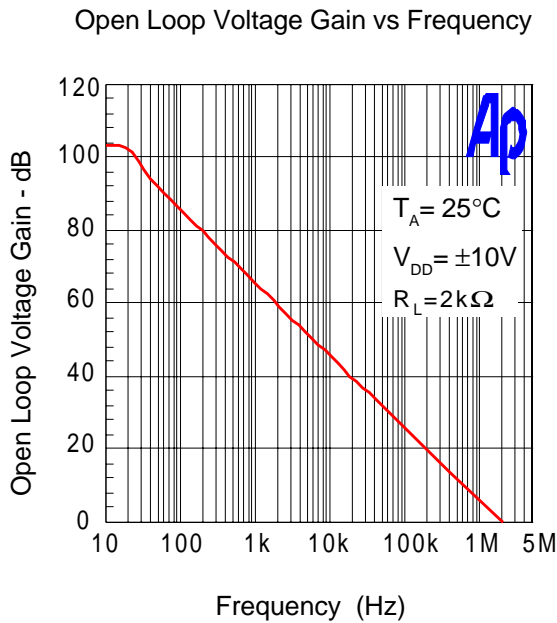


Figure 1

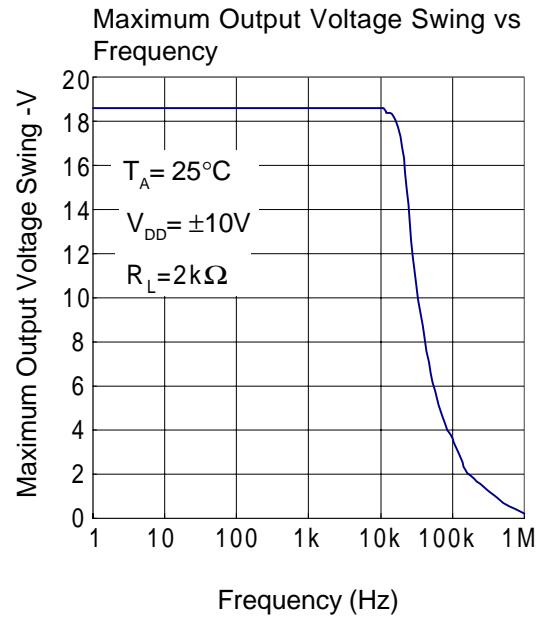


Figure 2

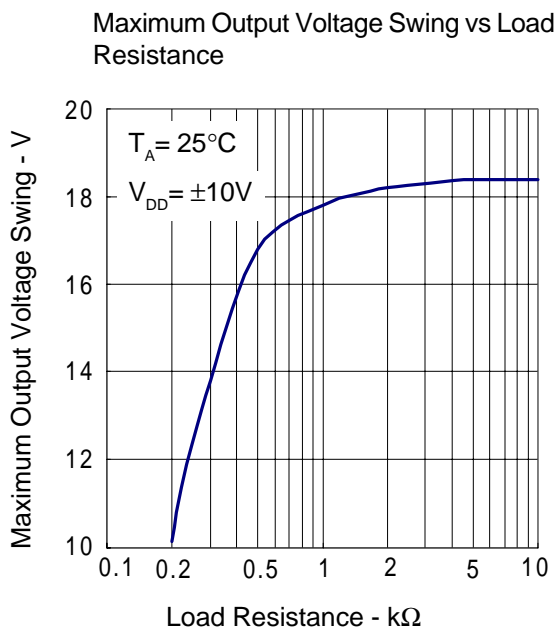


Figure 3

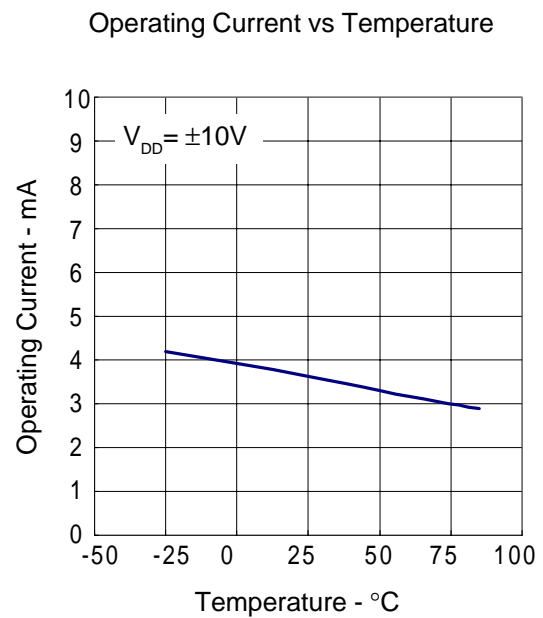


Figure 4

Typical Characteristics Cont.

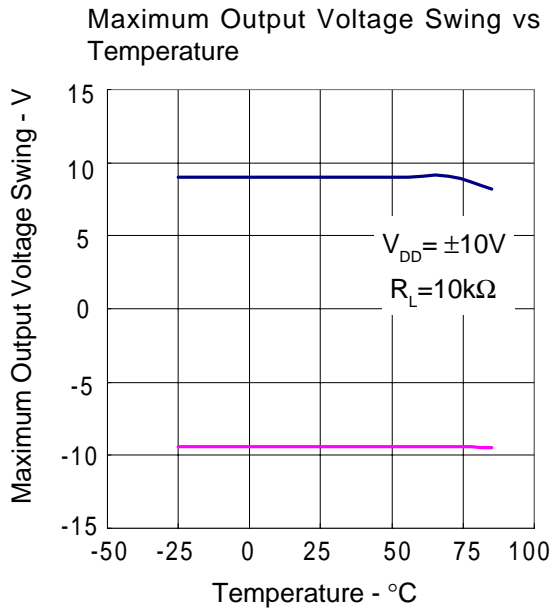


Figure 5

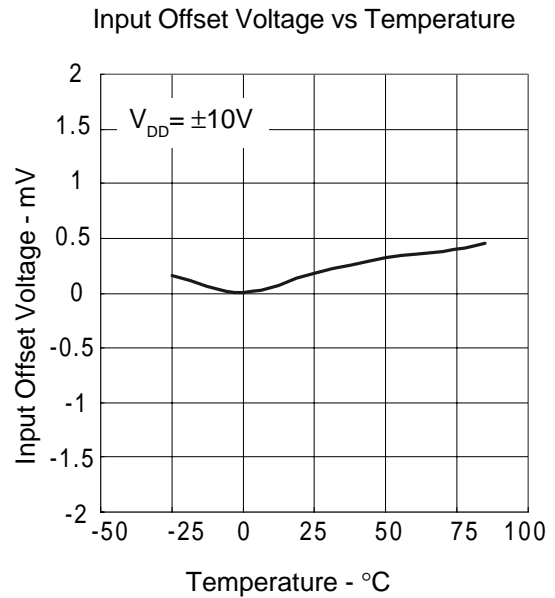


Figure 6

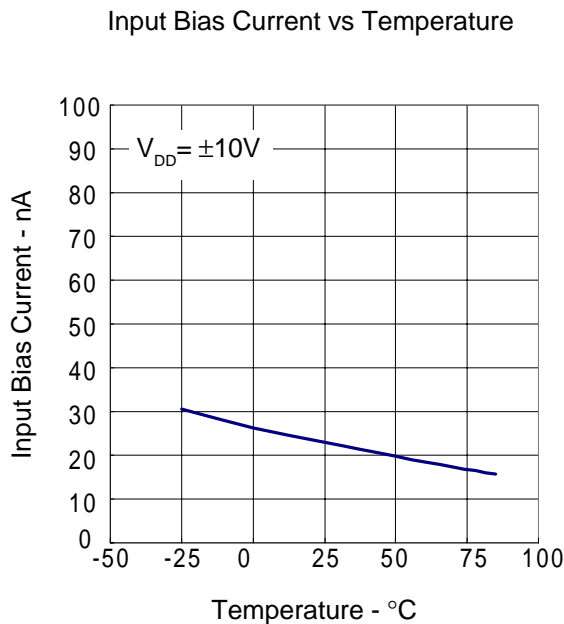


Figure 7

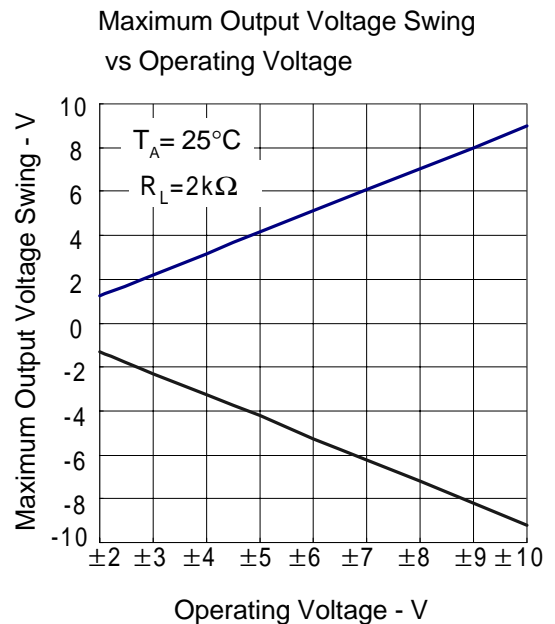


Figure 8

Typical Characteristics Cont.

Operating Current vs Operating Voltage

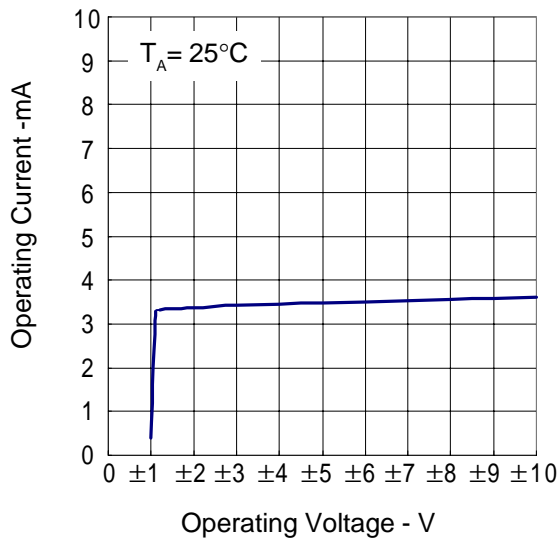


Figure 8

Voltage Follower pulse Response

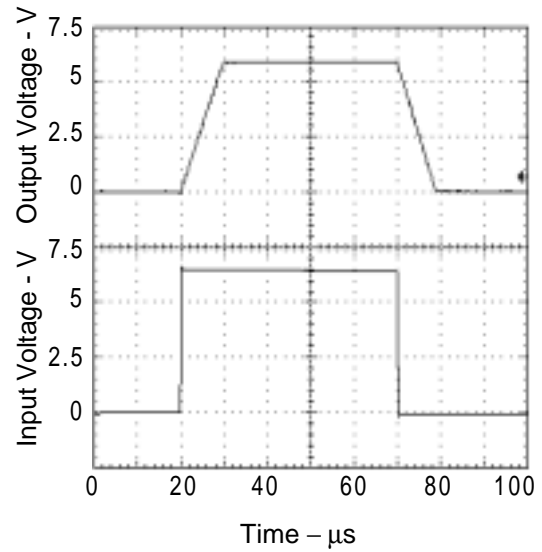
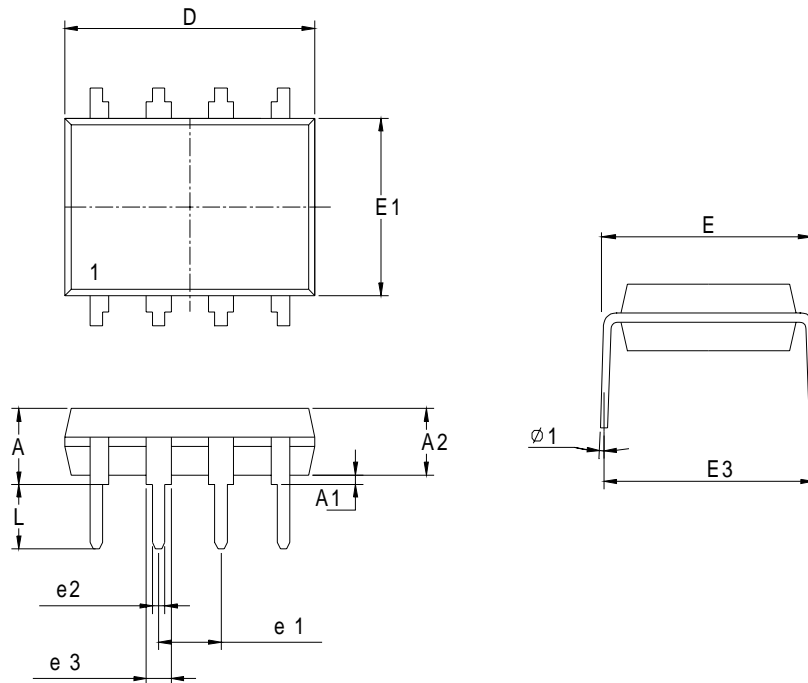


Figure 9

**Package Information**

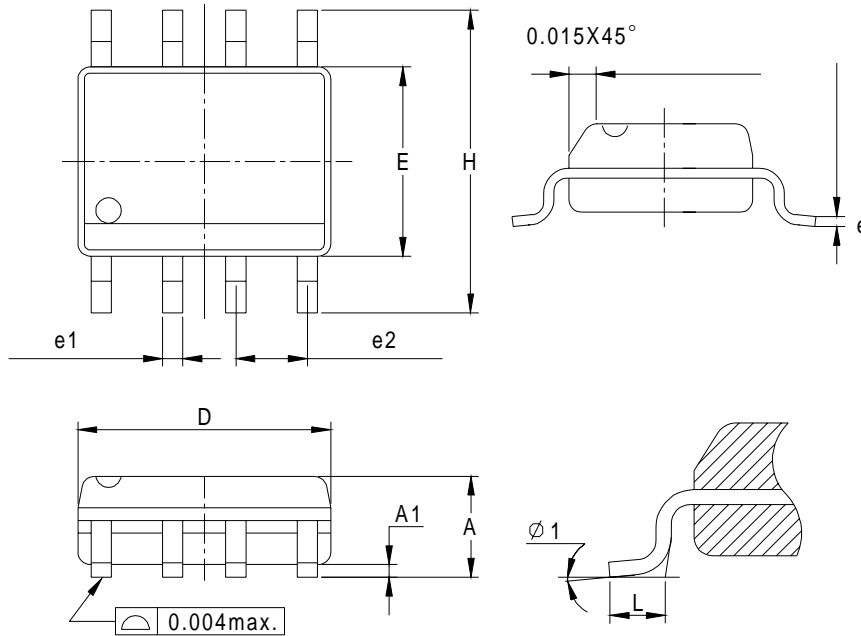
PDIP-8 pin ( Reference JEDEC Registration MS-001)



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	3.68	0.115	0.145
D	9.02	10.16	0.355	0.400
e1	2.54BSC		0.100BSC	
e2	0.36	0.56	0.014	0.022
e3	1.14	1.78	0.045	0.070
E	7.62 BSC		0.300 BSC	
E1	6.10	7.11	0.240	0.280
E3		10.92		0.430
L	2.92	3.81	0.115	0.150
phi 1	15°		15°	

**Package Information**

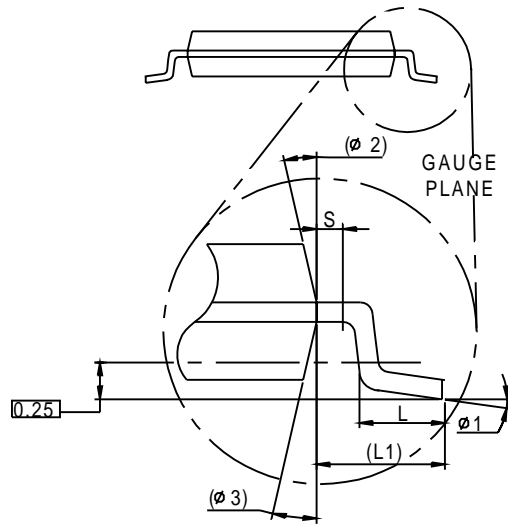
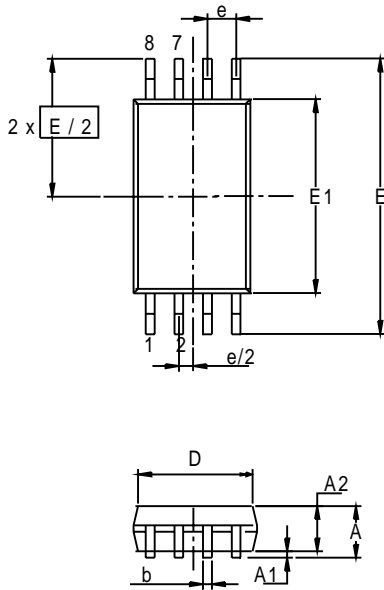
SOP- 8 pin ( Reference JEDEC Registration MS-012)



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	
$\phi 1$	8°		8°	

Package Information

TSSOP-8



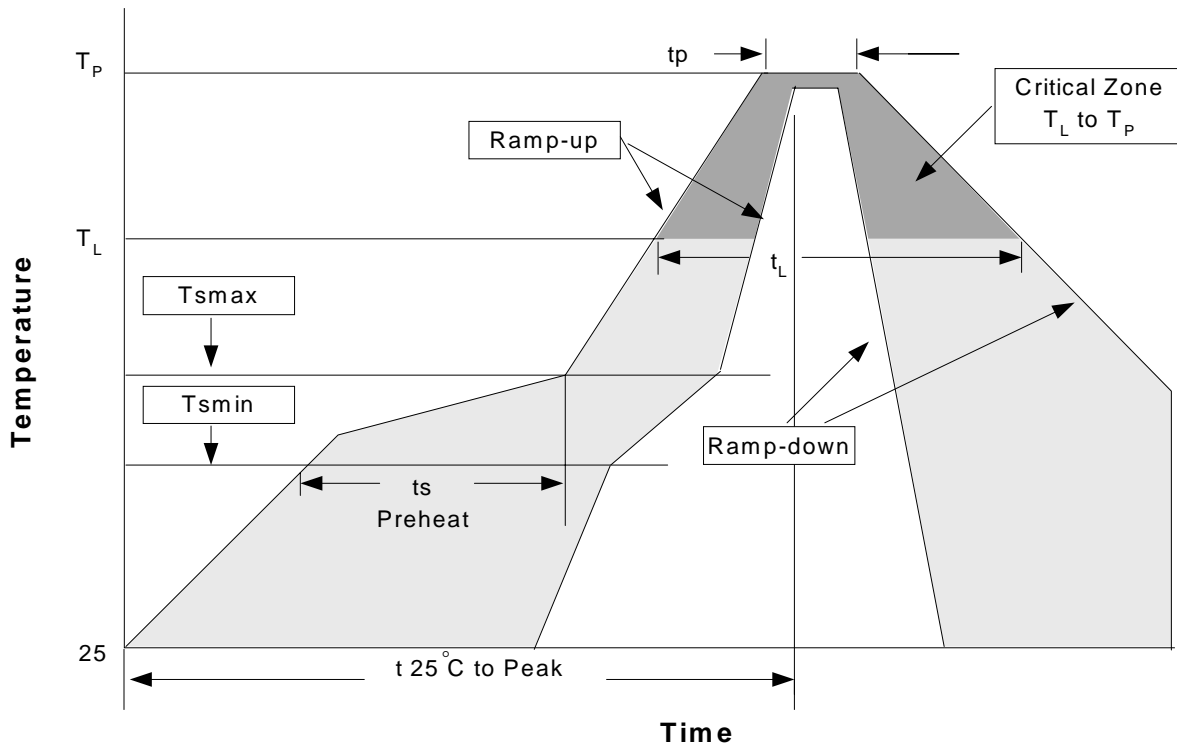
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		1.2		0.047
A1	0.00	0.15	0.000	0.006
A2	0.80	1.05	0.031	0.041
b	0.19	0.30	0.007	0.012
D	2.9	3.1	0.114	0.122
e	0.65 BSC		0.026 BSC	
E	6.40 BSC		0.252 BSC	
E1	4.30	4.50	0.169	0.177
L	0.45	0.75	0.018	0.030
L1	1.0 REF		0.039REF	
R	0.09		0.004	
R1	0.09		0.004	
S	0.2		0.008	
phi1	0°	8°	0°	8°
phi2	12° REF		12° REF	
phi3	12° REF		12° REF	



## 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)



### Classification Reflow Profiles

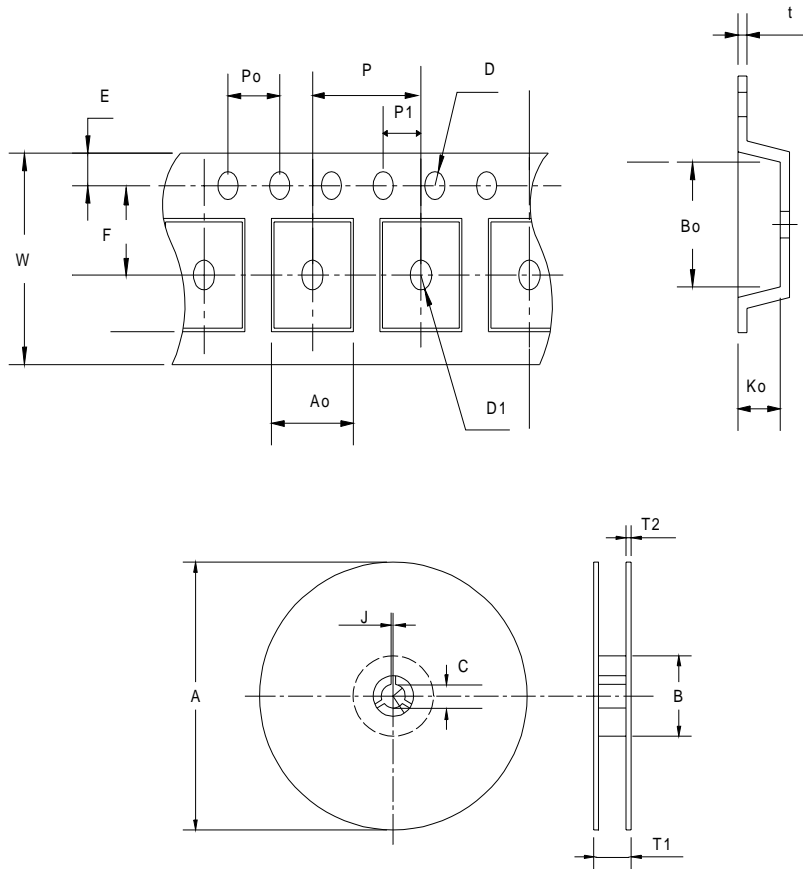
Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.		3°C/second max.	
Preheat				
- Temperature Min ( $T_{smin}$ )	100°C		150°C	
- Temperature Mix ( $T_{smax}$ )	150°C		200°C	
- Time (min to max)( $t_s$ )	60-120 seconds		60-180 seconds	
$T_{smax}$ to $T_L$			3°C/second max	
- Ramp-up Rate				
$T_{smax}$ to $T_L$				
- Temperature( $T_L$ )	183°C		217°C	
- Time ( $t_L$ )	60-150 seconds		60-150 seconds	
Peak Temperature( $T_p$ )	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature( $t_p$ )	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.

## 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, $1_{tr} > 100\text{mA}$

## Carrier Tape & Reel Dimensions



## Carrier Tape & Reel Dimensions

Application	A	B	C	J	T1	T2	W	P	E
SOP-8	330±1	62 ± 1.5	12.75 +0.15	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
Application	A	B	C	J	T1	T2	W	P	E
TSSOP-8	330 ± 1	62 +1.5	12.75+ 0.15	2 + 0.5	12.4 ± 0.2	2 ± 0.2	12± 0.3	8± 0.1	1.75±0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5 ± 0.1	1.5 + 0.1	1.5 + 0.1	4.0 ± 0.1	2.0 ± 0.1	7.0 ± 0.1	3.6 ± 0.3	1.6 ± 0.1	.3±0.013

(mm)

## Cover Tape Dimensions

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

## Customer Service

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