

# LM741

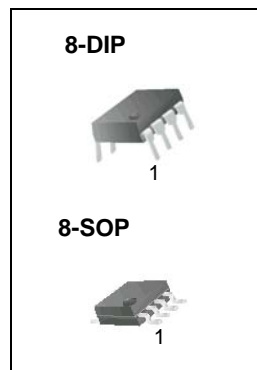
## Single Operational Amplifier

### Features

- Short Circuit Protection
- Excellent Temperature Stability
- Internal Frequency Compensation
- High Input Voltage Range
- Null of Offset

### Description

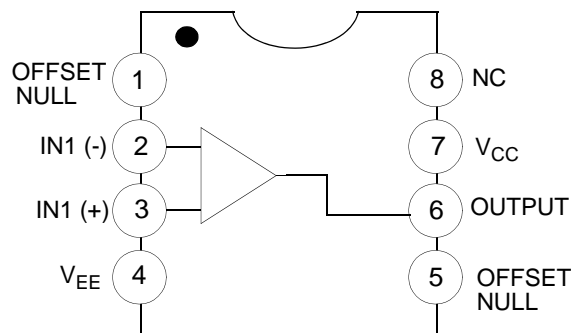
The LM741 series are general purpose operational amplifiers. It is intended for a wide range of analog applications. The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier, and general feedback applications..



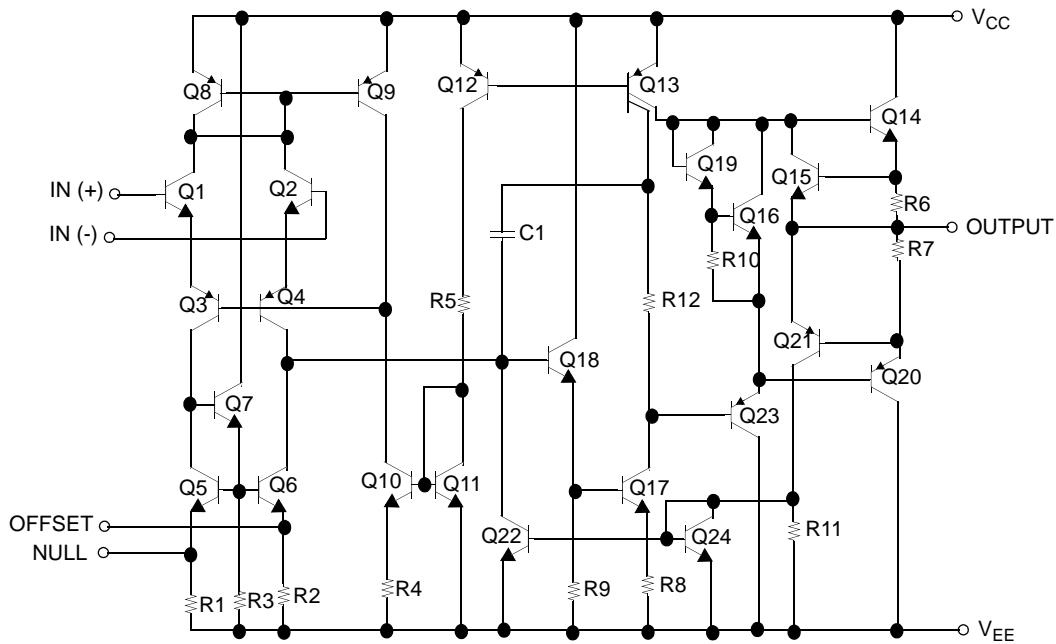
### Ordering Information

Part Number	Operating Temp. Range	Pb-Free	Package	Packing Method	Marking Code
LM741CN	0 ~ +70°C	YES	8-DIP	Rail	LM741CN
LM741CM		YES	8-SOP	Rail	LM741CM
LM741CMX		YES	8-SOP	Tape & Reel	LM741CM

### Internal Block Diagram



### Schematic Diagram



### Absolute Maximum Ratings

The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings.  $T_A=25^{\circ}\text{C}$ , unless otherwise specified.

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply Voltage	$\pm 18$	V
$V_{I(DIFF)}$	Differential Input Voltage	30	V
$V_I$	Input Voltage	$\pm 15$	V
-	Output Short Circuit Duration	Indefinite	-
$P_D$	Power Dissipation	500	mW
$T_{OPR}$	Operating Temperature Range	$0 \sim +70$	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range	$-65 \sim +150$	$^{\circ}\text{C}$

## Electrical Characteristics

( $V_{CC} = 15V$ ,  $V_{EE} = -15V$ ,  $T_A = 25^\circ C$ , unless otherwise specified)

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Offset Voltage		$V_{IO}$	$R_S \leq 10k\Omega$	-	2.0	6.0	mV
			$R_S \leq 50\Omega$	-	-	-	
Input Offset Voltage Adjustment Range		$V_{IO(R)}$	$V_{CC} = \pm 20V$	-	$\pm 15$	-	mV
Input Offset Current		$I_{IO}$	-	-	20	200	nA
Input Bias Current		$I_{BIAS}$	-	-	80	500	nA
Input Resistance (Note1)		$R_I$	$V_{CC} = \pm 20V$	0.3	2.0	-	M $\Omega$
Input Voltage Range		$V_{I(R)}$	-	$\pm 12$	$\pm 13$	-	V
Large Signal Voltage Gain		$G_V$	$R_L \geq 2k\Omega$ $V_{CC} = \pm 20V$ , $V_{O(P-P)} = \pm 15V$	-	-	-	V/mV
			$V_{CC} = \pm 15V$ , $V_{O(P-P)} = \pm 10V$	20	200	-	
Output Short Circuit Current		$I_{SC}$	-	-	25	-	mA
Output Voltage Swing		$V_{O(P-P)}$	$V_{CC} = \pm 20V$ $R_L \geq 10k\Omega$	-	-	-	V
			$R_L \geq 2k\Omega$	-	-	-	
			$V_{CC} = \pm 15V$ $R_L \geq 10k\Omega$	$\pm 12$	$\pm 14$	-	
			$R_L \geq 2k\Omega$	$\pm 10$	$\pm 13$	-	
Common Mode Rejection Ratio		CMRR	$R_S \leq 10k\Omega$ , $V_{CM} = \pm 12V$	70	90	-	dB
			$R_S \leq 50\Omega$ , $V_{CM} = \pm 12V$	-	-	-	
Power Supply Rejection Ratio		PSRR	$V_{CC} = \pm 15V$ to $V_{CC} = \pm 15V$ $R_S \leq 50\Omega$	-	-	-	dB
			$V_{CC} = \pm 15V$ to $V_{CC} = \pm 15V$ $R_S \leq 10k\Omega$	77	96	-	
Transient	Rise Time	$T_R$	Unity Gain	-	0.3	-	$\mu s$
Response	Overshoot	OS		-	10	-	%
Bandwidth		BW	-	-	-	-	MHz
Slew Rate		SR	Unity Gain	-	0.5	-	V/ $\mu s$
Supply Current		$I_{CC}$	$R_L = \infty\Omega$	-	1.5	2.8	mA
Power Consumption		$P_C$	$V_{CC} = \pm 20V$	-	-	-	mW
			$V_{CC} = \pm 15V$	-	50	85	

### Note:

1. Guaranteed by design.

**Electrical Characteristics** (Continued)(  $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$ ,  $V_{CC} = \pm 15\text{V}$ , unless otherwise specified)The following specification apply over the range of  $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$  for the LM741C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Input Offset Voltage	$V_{IO}$	$R_S \leq 50\Omega$	-	-	-	mV	
		$R_S \leq 10k\Omega$	-	-	7.5		
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	-	-	-	-	$\mu\text{V}/^{\circ}\text{C}$	
Input Offset Current	$I_{IO}$	-	-	-	300	nA	
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$	-	-	-	-	nA/ $^{\circ}\text{C}$	
Input Bias Current	$I_{BIAS}$	-	-	-	0.8	$\mu\text{A}$	
Input Resistance (Note1)	$R_I$	$V_{CC} = \pm 20\text{V}$	-	-	-	M $\Omega$	
Input Voltage Range	$V_{I(R)}$	-	$\pm 12$	$\pm 13$	-	V	
Output Voltage Swing	$V_{O(P-P)}$	$V_{CC} = \pm 20\text{V}$	$R_S \geq 10k\Omega$	-	-	-	V
			$R_S \geq 2k\Omega$	-	-	-	
		$V_{CC} = \pm 15\text{V}$	$R_S \geq 10k\Omega$	$\pm 12$	$\pm 14$	-	
			$R_S \geq 2k\Omega$	$\pm 10$	$\pm 13$	-	
Output Short Circuit Current	$I_{SC}$	-	10	-	40	mA	
Common Mode Rejection Ratio	CMRR	$R_S \leq 10k\Omega$ , $V_{CM} = \pm 12\text{V}$	70	90	-	dB	
		$R_S \leq 50\Omega$ , $V_{CM} = \pm 12\text{V}$	-	-	-		
Power Supply Rejection Ratio	PSRR	$V_{CC} = \pm 20\text{V}$ to $\pm 5\text{V}$	$R_S \leq 50\Omega$	-	-	-	dB
			$R_S \leq 10k\Omega$	77	96	-	
Large Signal Voltage Gain	$G_V$	$R_S \geq 2k\Omega$	$V_{CC} = \pm 20\text{V}$ , $V_{O(P-P)} = \pm 15\text{V}$	-	-	-	V/mV
			$V_{CC} = \pm 15\text{V}$ , $V_{O(P-P)} = \pm 10\text{V}$	15	-	-	
			$V_{CC} = \pm 15\text{V}$ , $V_{O(P-P)} = \pm 2\text{V}$	-	-	-	

**Note :**

1. Guaranteed by design.

## Typical Performance Characteristics

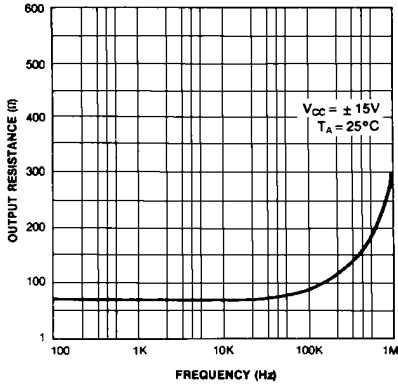


Figure 1. Output Resistance vs Frequency

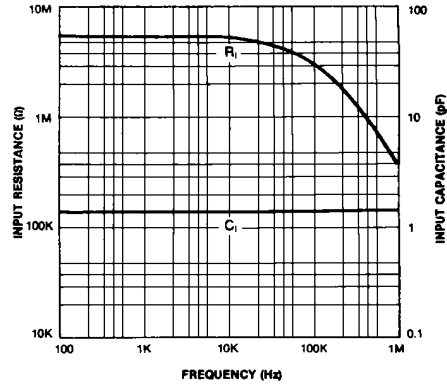


Figure 2. Input Resistance and Input Capacitance vs Frequency

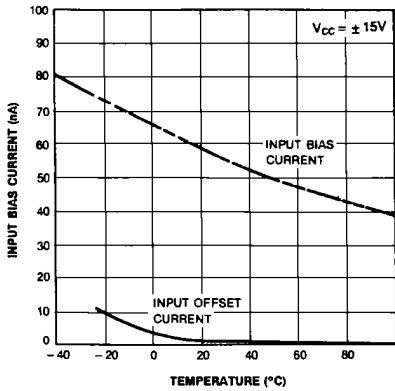


Figure 3. Input Bias Current vs Ambient Temperature

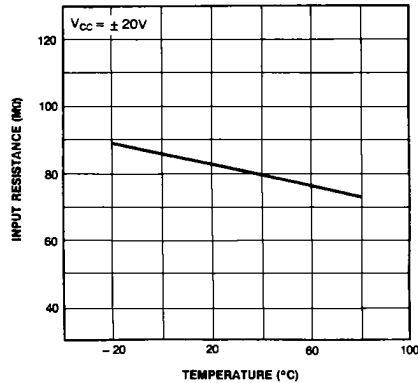


Figure 4. Power Consumption vs Ambient Temperature

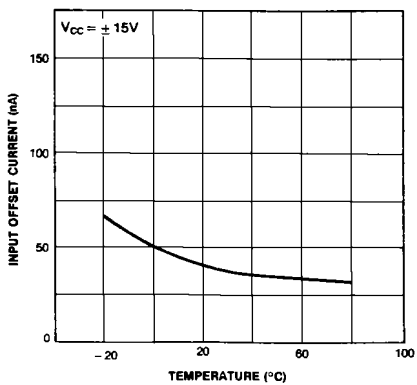


Figure 5. Input Offset Current vs Ambient Temperature

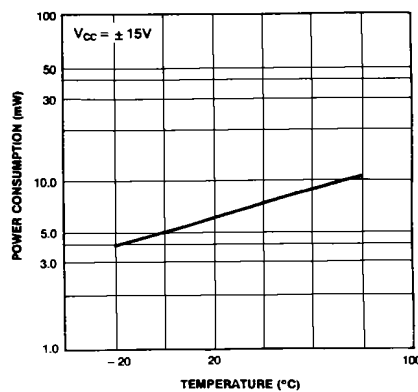


Figure 6. Input Resistance vs Ambient Temperature

## Typical Performance Characteristics (Continued)

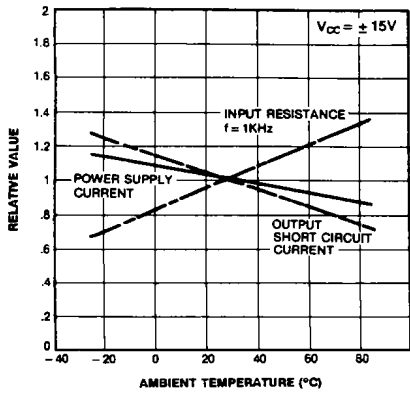


Figure 7. Normalized DC Parameters vs Ambient Temperature

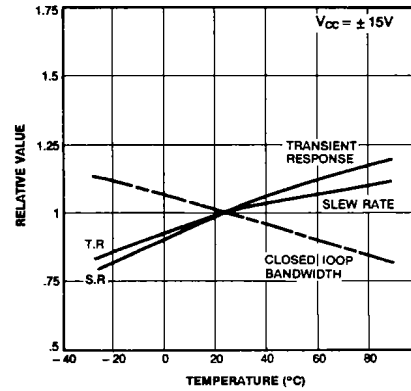


Figure 8. Frequency Characteristics vs Ambient Temperature

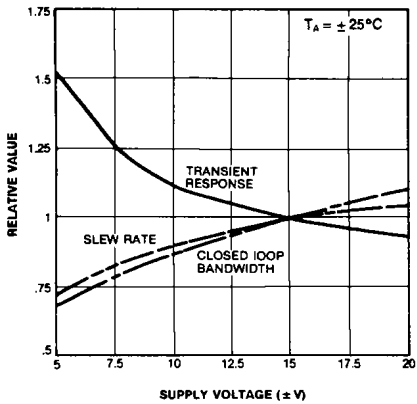


Figure 9. Frequency Characteristics vs Supply Voltage

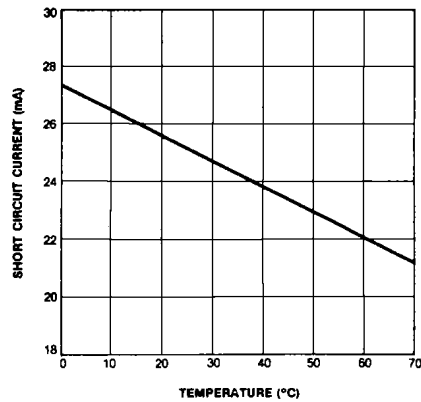


Figure 10. Output Short Circuit Current vs Ambient Temperature

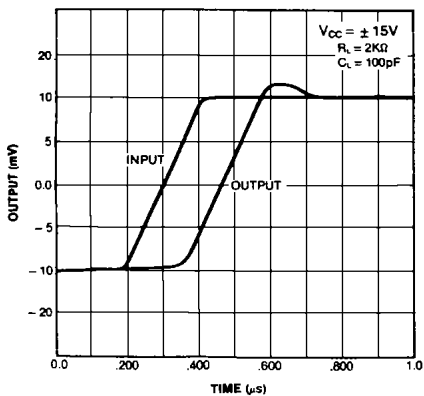


Figure 11. Transient Response

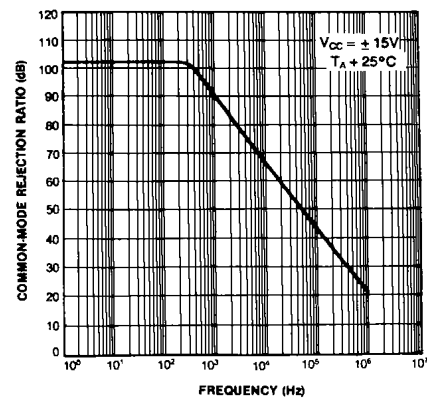


Figure 12. Common-Mode Rejection Ratio vs Frequency

## Typical Performance Characteristics (Continued)

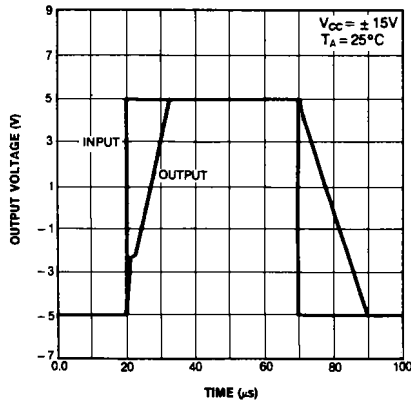


Figure 1. Voltage Follower Large Signal Pulse Response

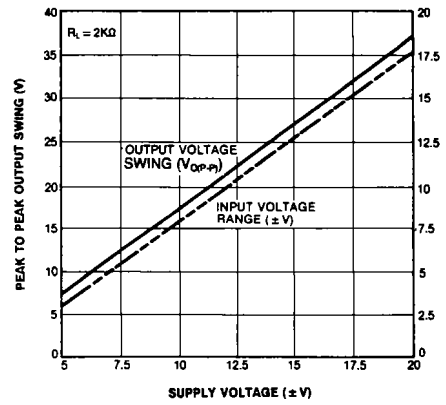
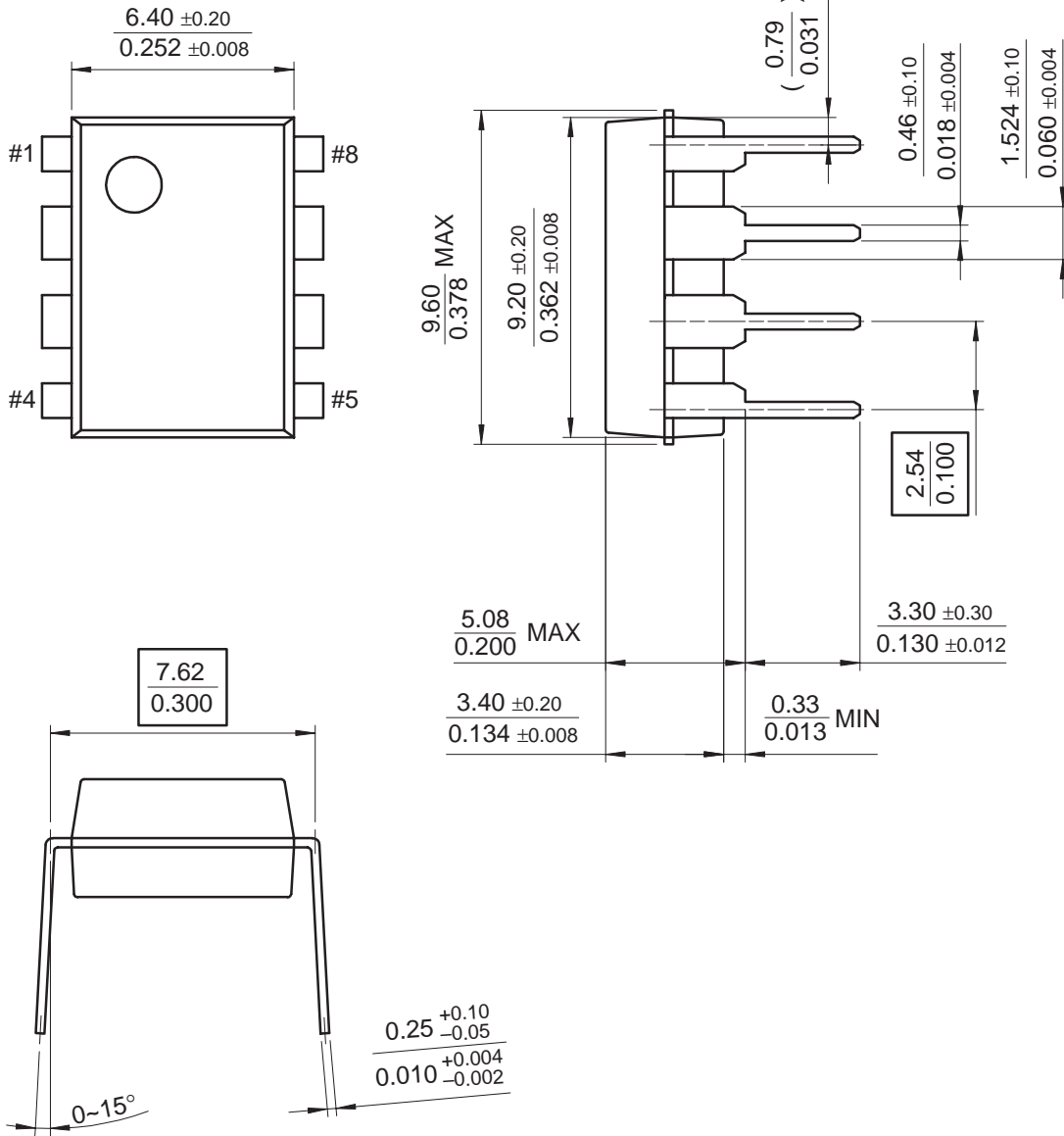


Figure 2. Output Swing and Input Range vs Supply Voltage

Package

Dimensions in millimeters

8-DIP



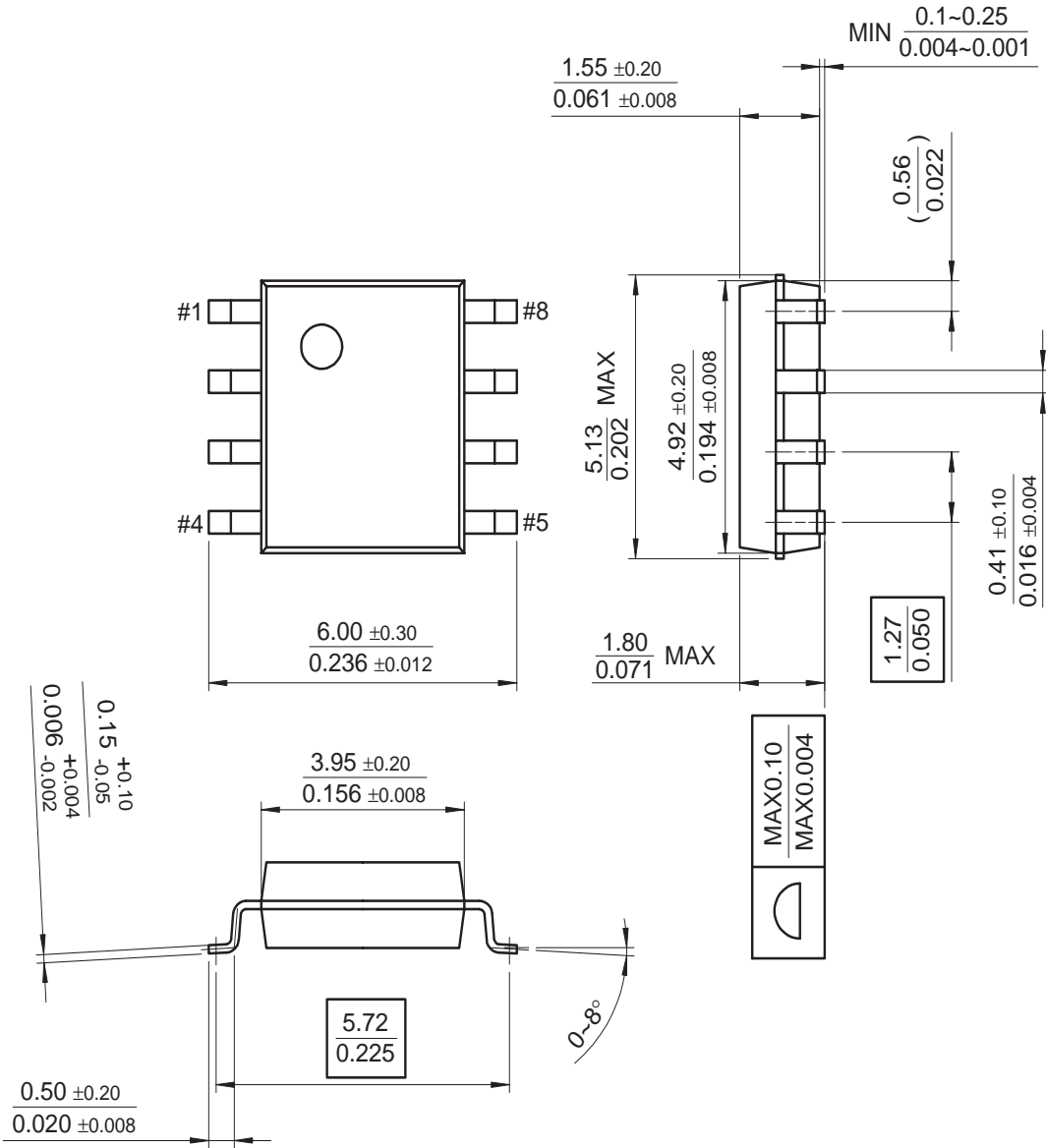


**Mechanical Dimensions** (Continued)

**Package**

Dimensions in millimeters

**8-SOP**



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CoolFET™	I <sup>2</sup> C™	PACMAN™	SuperFET™	
CROSSVOLT™	i-Lo™	POPT™	SuperSOT™-3	
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FACT®	MICROCOUPLER™	QFET®	TinyBoost™	
FAST®	MicroFET™	QS™	TinyBuck™	
FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
FPS™	MICROWIRE™	Quiet Series™	TinyPower™	
FRFET™	MSX™	RapidConfigure™	TinyLogic®	
	MSXPro™	RapidConnect™	TINYOPTO™	
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Programmable Active Droop™				

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