FAIRCHILD SEMICONDUCTOR®

February 2007

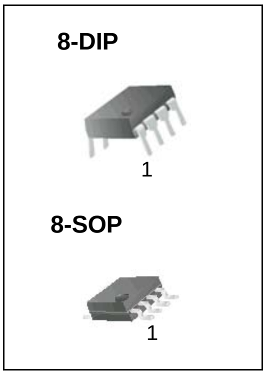
LM741
Single Operational Amplifier

Features

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

Description

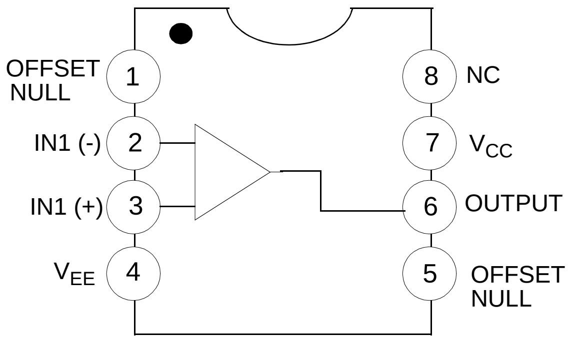
The LM741 series are general purpose operational amplifiers. It is intended for a wide range of analog applications. The high gain and wide range of operating voltage provide superior performance in intergrator, summing amplifier, and general feedback applications..



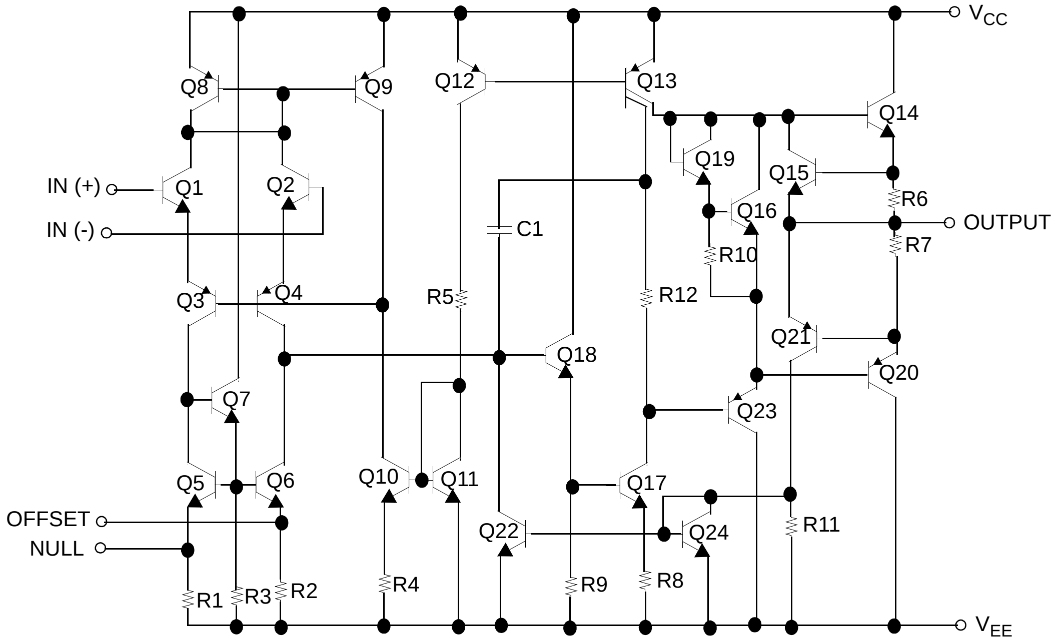
Ordering Information

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°C, unless otherwise specified.

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

Electrical Characteristics

(V_{CC} = 15V, V_{EE} = -15V, T_A = 25°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		$V_{IO(R)}$	$V_{CC} = \pm 20V$		-	±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	-	MΩ
Input Voltage Range		$V_{I(R)}$	-		±12	±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
				$R_L \geq 2k\Omega$	-	-	-	
			$V_{CC} = \pm 15V$	$R_L \geq 10k\Omega$	±12	±14	-	
				$R_L \geq 2k\Omega$	±10	±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	-	μs
Response	Overshoot	OS			-	10	-	%
Bandwidth		BW	-		-	-	-	MHz
Slew Rate		SR	Unity Gain		-	0.5	-	V/μs
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°C ≤ T_A ≤ 70 °C, V_{CC} = ±15V, unless otherwise specified)
The following specification apply over the range of 0°C ≤ T_A ≤ +70°C for the LM741C

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

Note :
1. Guaranteed by design.

Typical Performance Characteristics

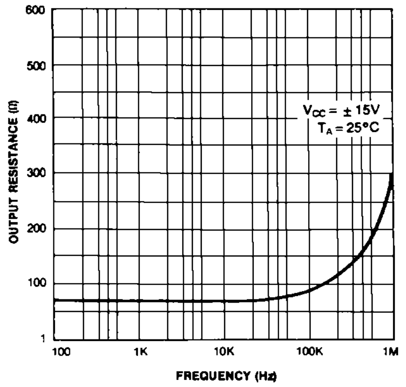


Figure 1. Output Resistance vs Frequency

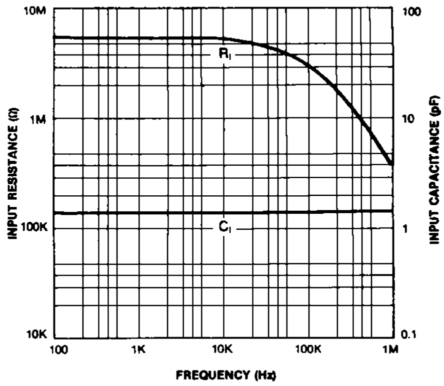


Figure 2. Input Resistance and Input Capacitance vs Frequency

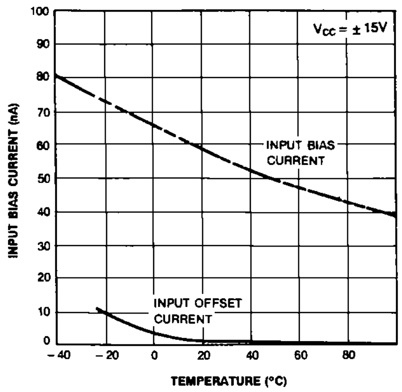


Figure 3. Input Bias Current vs Ambient Temperature

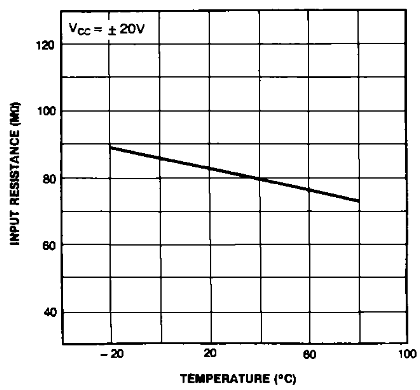


Figure 4. Power Consumption vs Ambient Temperature

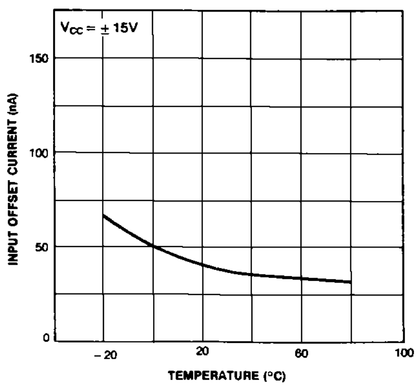


Figure 5. Input Offset Current vs Ambient Temperature

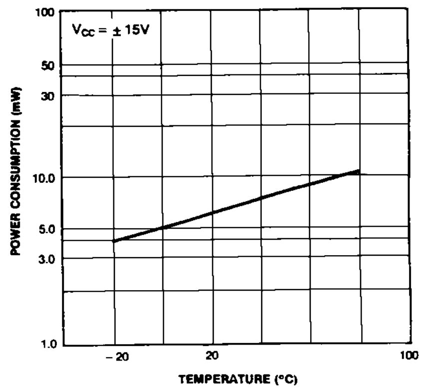


Figure 6. Input Resistance vs Ambient Temperature

Typical Performance Characteristics (Continued)

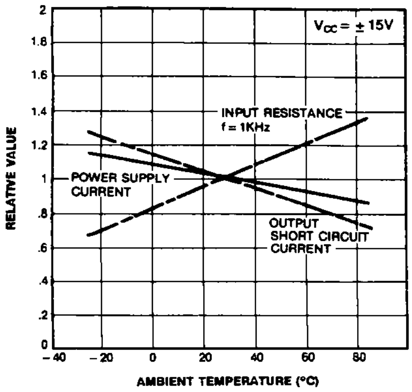


Figure 7. Normalized DC Parameters vs Ambient Temperature

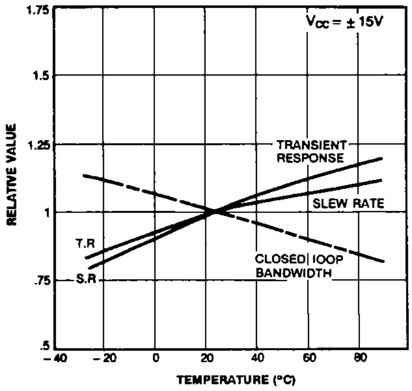


Figure 8. Frequency Characteristics vs Ambient Temperature

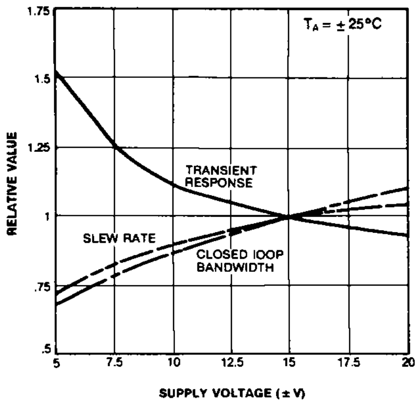


Figure 9. Frequency Characteristics vs Supply Voltage

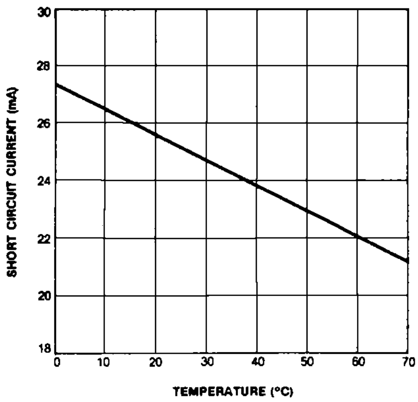


Figure 10. Output Short Circuit Current vs Ambient Temperature

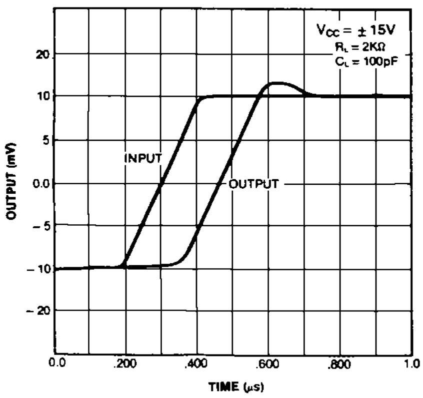


Figure 11. Transient Response

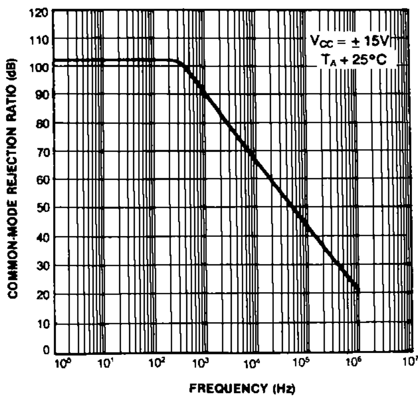


Figure 12. Common-Mode Rejection Ratio vs Frequency

Typical Performance Characteristics (Continued)

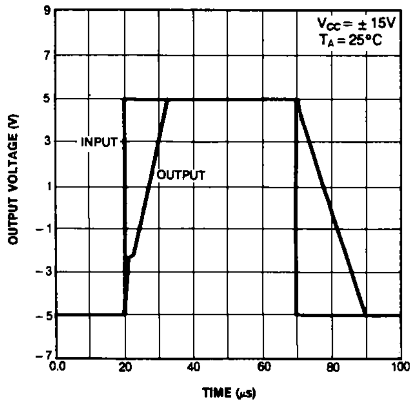


Figure 1. Voltage Follower Large Signal Pulse Response

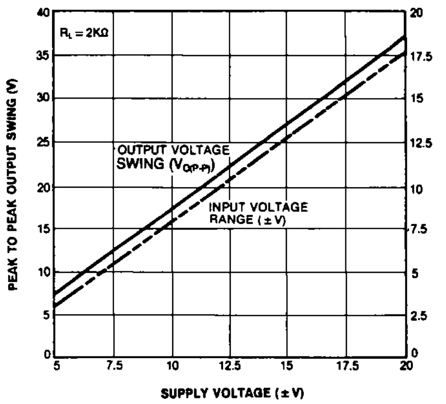
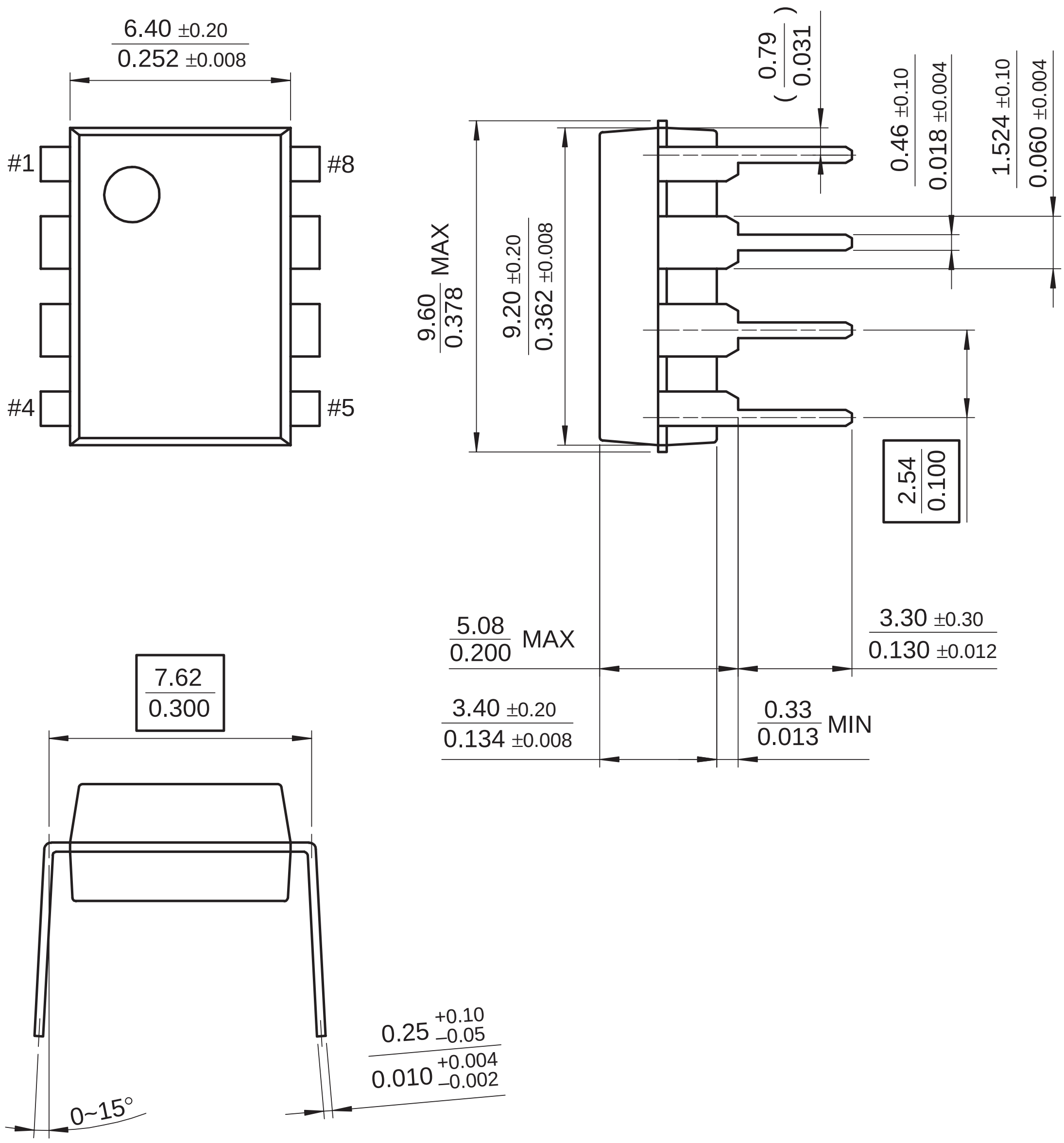


Figure 2. Output Swing and Input Range vs Supply Voltage

Package

Dimensions in millimeters

8-DIP

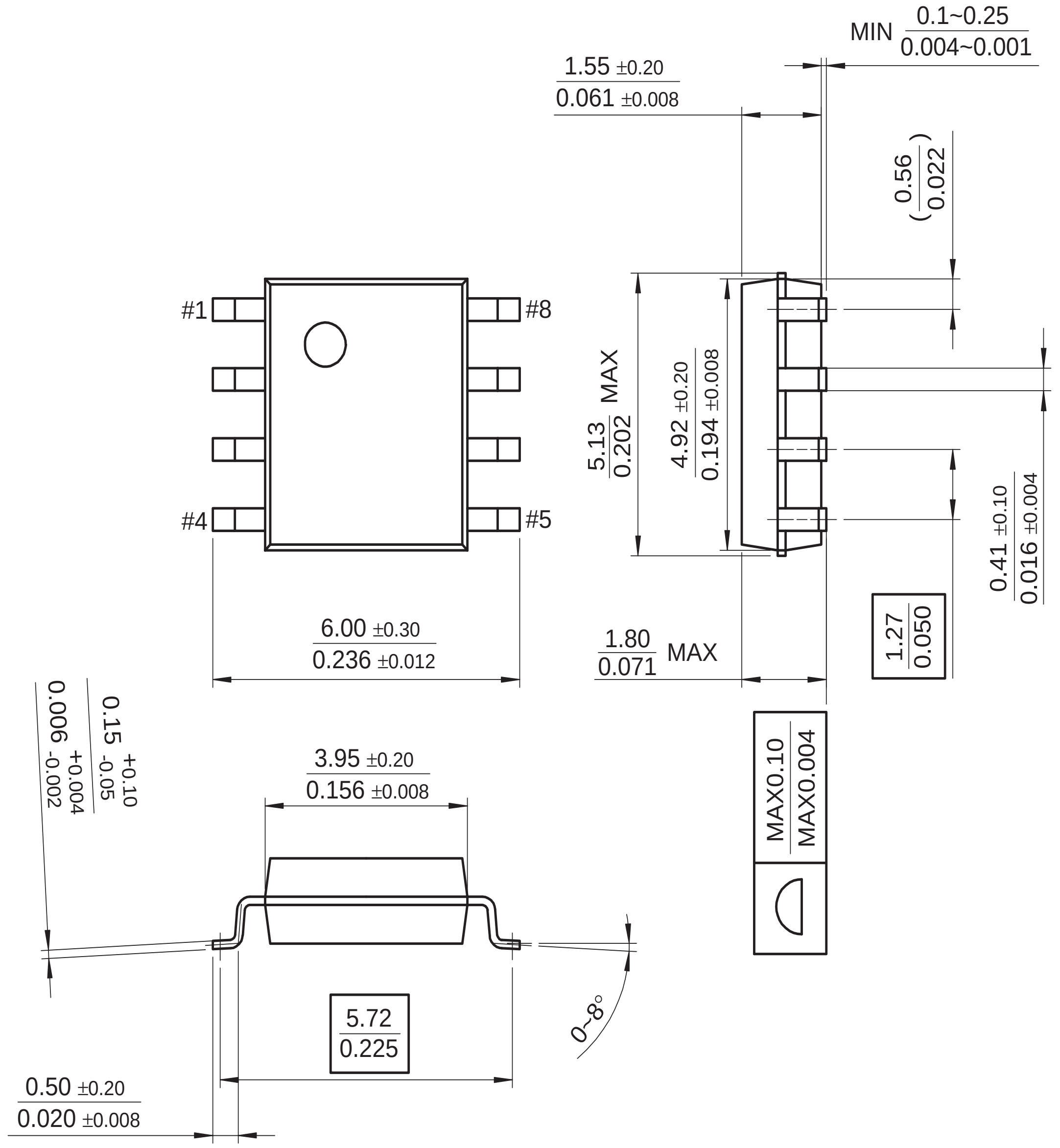


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-SOP



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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
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