FAIRCHILD
SEMICONDUCTOR®

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.

8-DIP

8-SOP

Internal Block Diagram
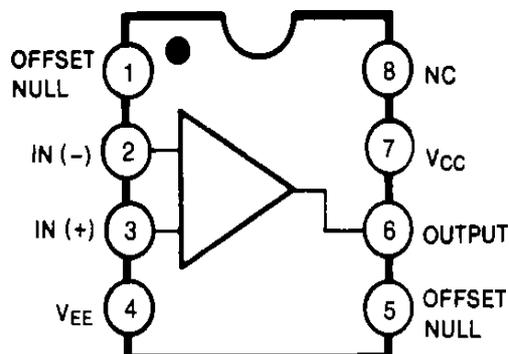
Schematic Diagram
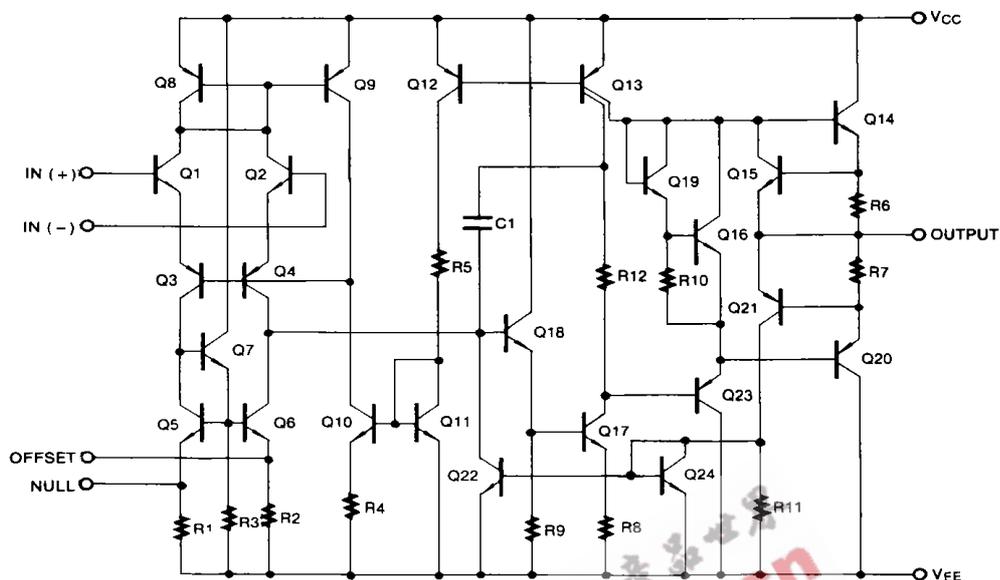
Absolute Maximum Ratings ($T_A = 25°C$)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	±18	V
Differential Input Voltage	$V_{I(DIFF)}$	30	V
Input Voltage	V_I	±15	V
Output Short Circuit Duration	-	Indefinite	-
Power Dissipation	P_D	500	mW
Operating Temperature Range LM741C LM741I	T_{OPR}	0 ~ + 70 -40 ~ +85	°C
Storage Temperature Range	T_{STG}	-65 ~ + 150	°C

Electrical Characteristics

(V_{CC} = 15V, V_{EE} = - 15V. T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Conditions		LM741C/LM741I			Unit
					Min.	Typ.	Max.	
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} = ±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} =±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} =±20V, $V_{O(P-P)}$ =±15V	-	-	-	V/mV
				V_{CC} =±15V, $V_{O(P-P)}$ =±10V	20	200	-	
Output Short Circuit Current		I_{SC}	-		-	25	-	mA
Output Voltage Swing		$V_{O(P-P)}$	V_{CC} = ±20V	$R_L \geq 10K\Omega$	-	-	-	V
				$R_L \geq 2K\Omega$	-	-	-	
			V_{CC} = ±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} = ±12V		70	90	-	dB
			$R_S \leq 50\Omega$, V_{CM} = ±12V		-	-	-	
Power Supply Rejection Ratio		PSRR	V_{CC} = ±15V to V_{CC} = ±15V $R_S \leq 50\Omega$		-	-	-	dB
			V_{CC} = ±15V to V_{CC} = ±15V $R_S \leq 10K\Omega$		77	96	-	
Transient Response	Rise Time	T_R	Unity Gain		-	0.3	-	µs
	Overshoot	OS			-	10	-	%
Bandwidth		BW	-		-	-	-	MHz
Slew Rate		SR	Unity Gain		-	0.5	-	V/µs
Supply Current		I_{CC}	R_L = ∞Ω		-	1.5	2.8	mA
Power Consumption		P_C	V_{CC} = ±20V		-	-	-	mW
			V_{CC} = ±15V		-	50	85	

Note:
1. Guaranteed by design.

Electrical Characteristics

(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; and the -40°C ≤ T_A ≤ +85 °C for the LM741I

Parameter	Symbol	Conditions		LM741C/LM741I			Unit
				Min.	Typ.	Max.	
Input Offset Voltage	V_{IO}	R_S≤50Ω		-	-	-	mV
		R_S≤10KΩ		-	-	7.5	
Input Offset Voltage Drift	ΔV_{IO}/ΔT	-		-	-		µV/ °C
Input Offset Current	I_{IO}	-		-	-	300	nA
Input Offset Current Drift	ΔI_{IO}/ΔT	-		-	-		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
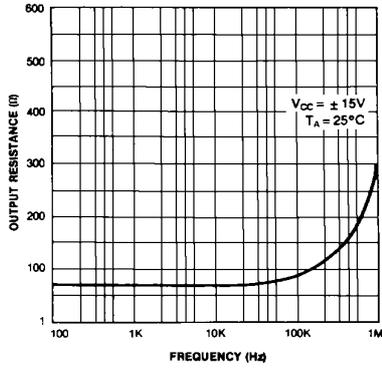
Figure 1. Output Resistance vs Frequency
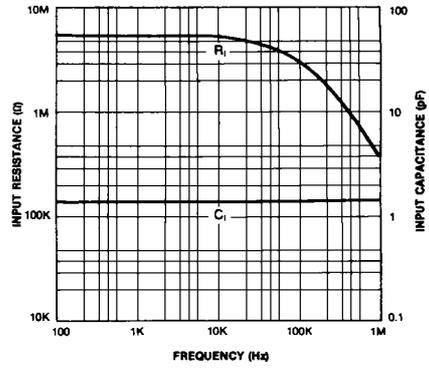
Figure 2. Input Resistance and Input Capacitance vs Frequency
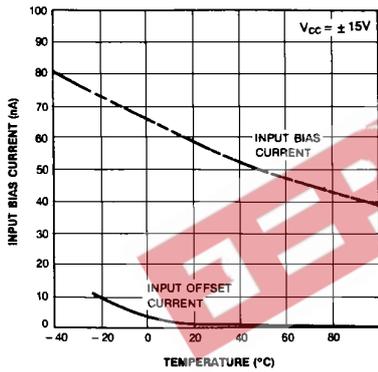
Figure 3. Input Bias Current vs Ambient Temperature
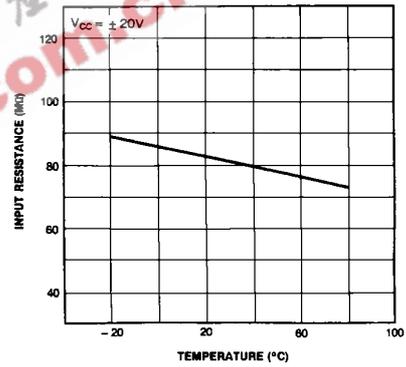

Figure 4. Power Consumption vs Ambient Temperature
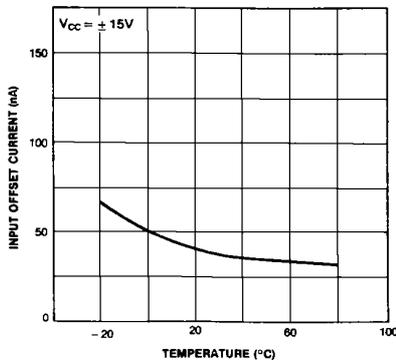

Figure 5. Input Offset Current vs Ambient Temperature
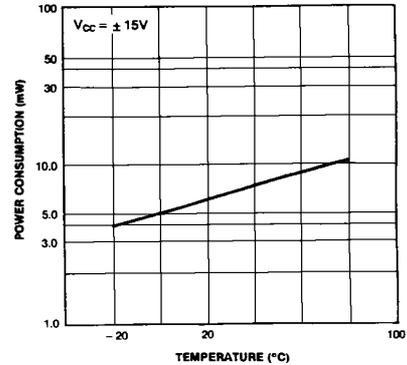
Figure 6. Input Resistance vs Ambient Temperature

# Typical Performance Characteristics (continued)
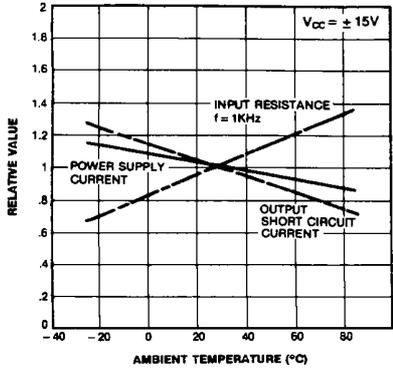

Figure 7. Normalized DC Parameters vs Ambient Temperature
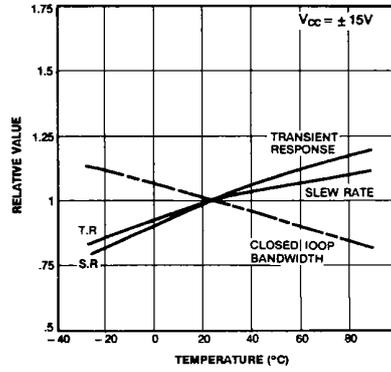
Figure 8. Frequency Characteristics vs Ambient Temperature
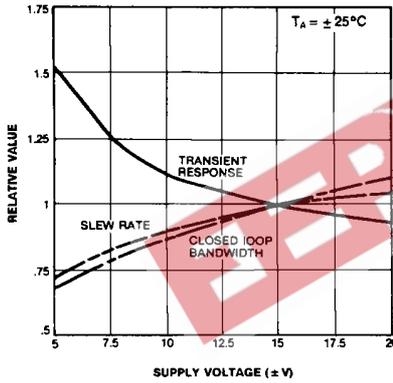
Figure 9. Frequency Characteristics vs Supply Voltage
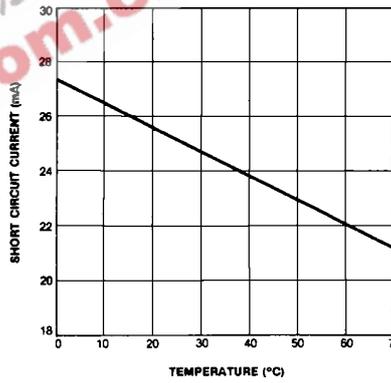
Figure 10. Output Short Circuit Current vs Ambient Temperature
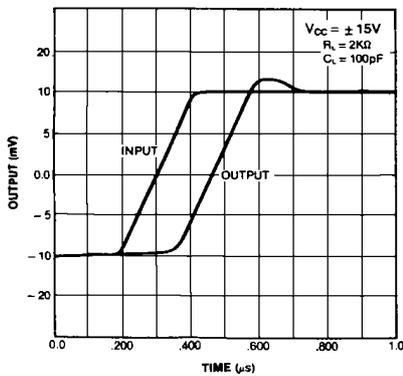

Figure 11. Transient Response
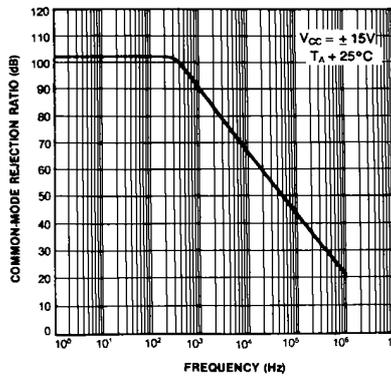
Figure 12. Common-Mode Rejection Ratio vs Frequency

Typical Performance Characteristics (continued)
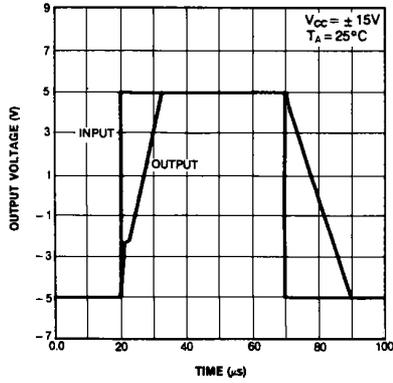
Figure 13. Voltage Follower Large Signal Pulse Response
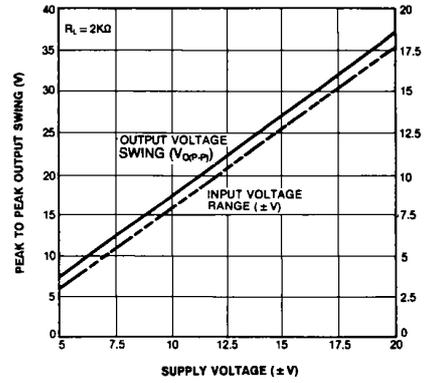
Figure 14. Output Swing and Input Range
vs Supply Voltage

Mechanical Dimensions

Package

8-DIP

$\dfrac{6.40 \pm 0.20}{0.252 \pm 0.008}$

#1   #8

#4   #5

$\dfrac{9.60}{0.378}$ MAX

$\dfrac{9.20 \pm 0.20}{0.362 \pm 0.008}$

$\left(\dfrac{0.79}{0.031} \right)$

$\dfrac{0.46 \pm 0.10}{0.018 \pm 0.004}$

$\dfrac{1.524 \pm 0.10}{0.060 \pm 0.004}$

$\dfrac{2.54}{0.100}$

$\dfrac{3.30 \pm 0.30}{0.130 \pm 0.012}$

$\dfrac{5.08}{0.200}$ MAX

$\dfrac{7.62}{0.300}$

$\dfrac{3.40 \pm 0.20}{0.134 \pm 0.008}$

$\dfrac{0.33}{0.013}$ MIN

$\dfrac{0.25 {}^{+0.10}_{-0.05}}{0.010 {}^{+0.004}_{-0.002}}$

0~15°
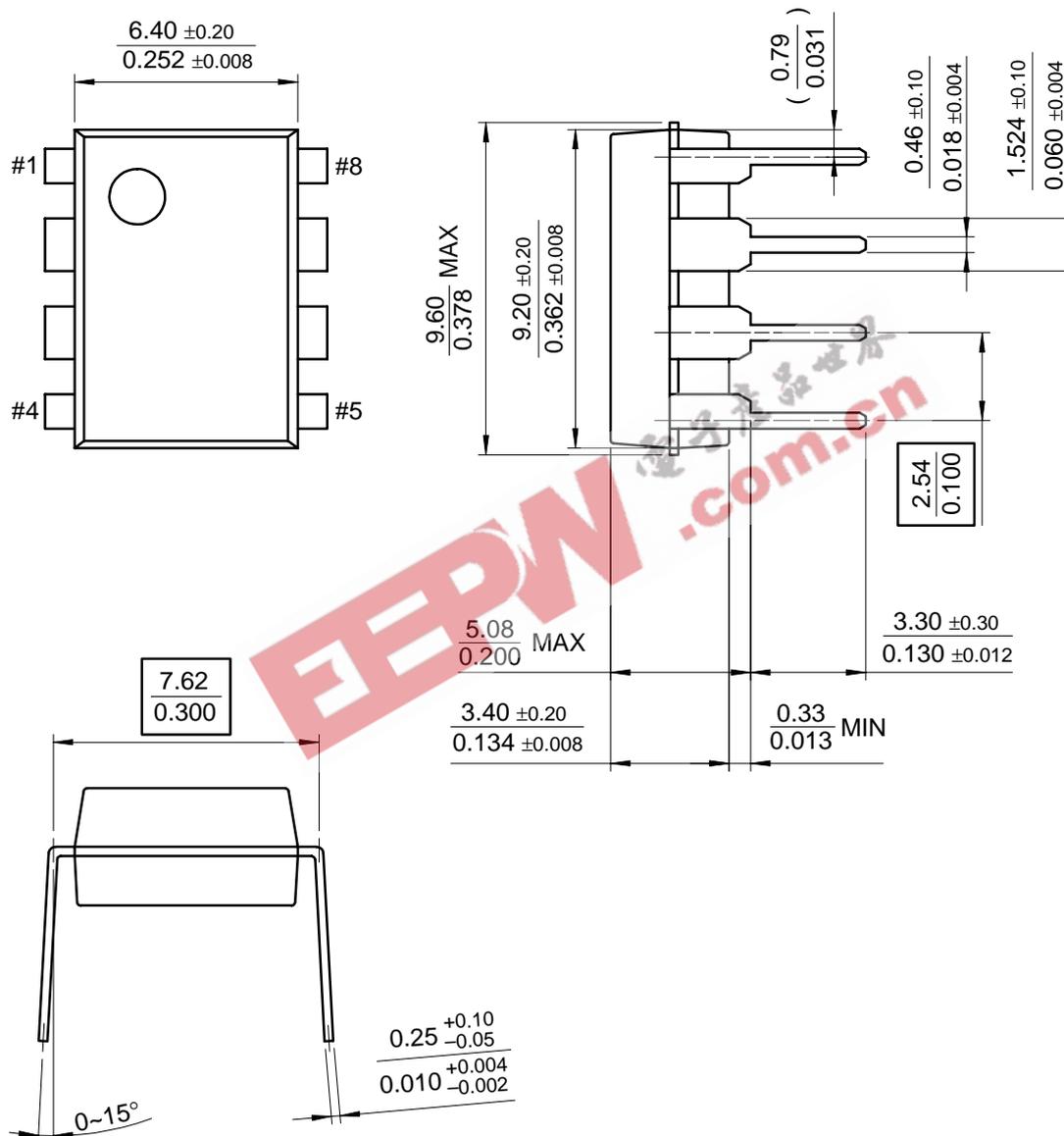
Mechanical Dimensions (Continued)

Package

8-SOP
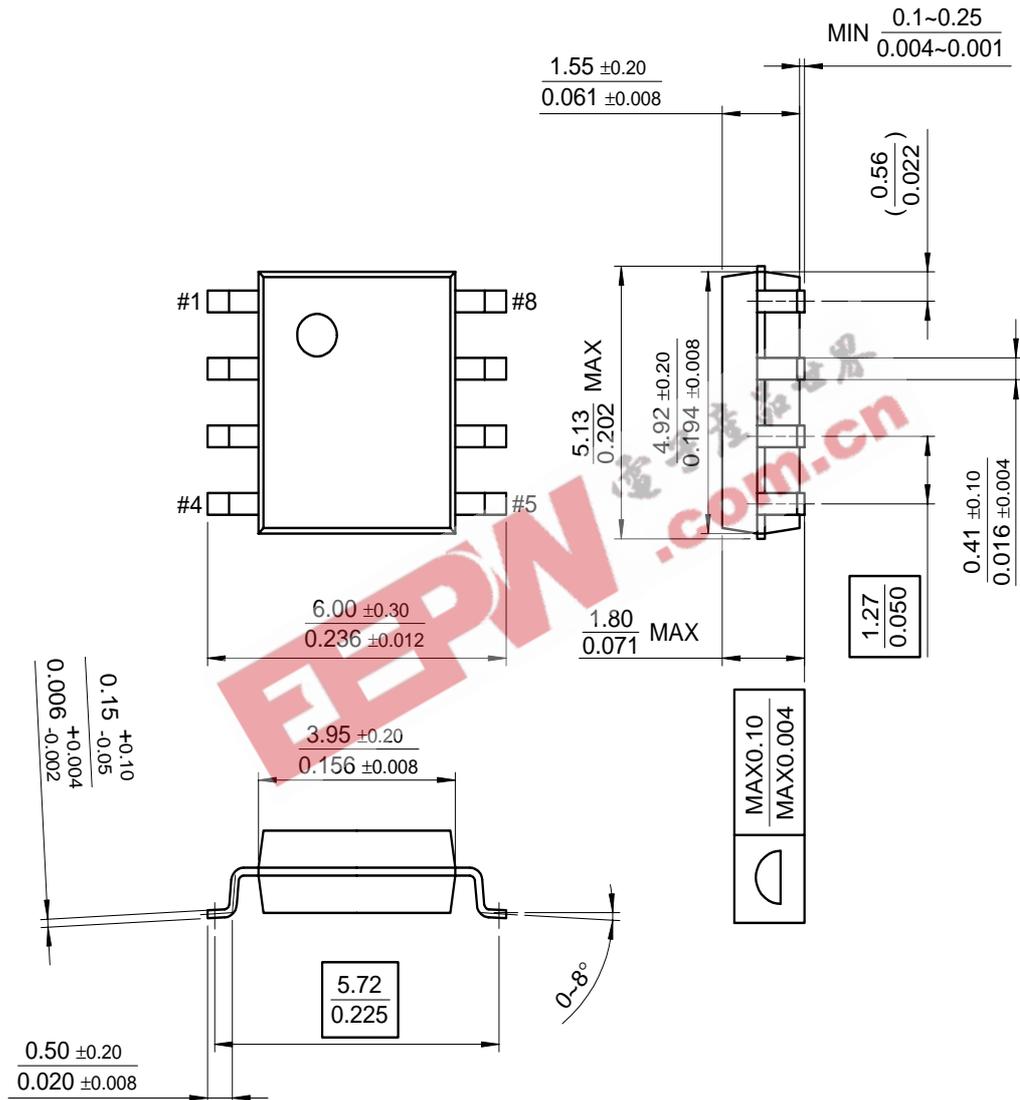
Ordering Information

Product Number	Package	Operating Temperature
LM741CN	8-DIP	0 ~ + 70°C
LM741CM	8-SOP	
LM741IN	8-DIP	-40 ~ + 85°C