

ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage	18V
Power Dissipation	500mW
Operating Temperature Range	
LTC1059C	$-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$
LTC1059AM, LTC1059M	$-55^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	300°C

PACKAGE/ORDER INFORMATION

TOP VIEW		ORDER PART NUMBER
		LTC1059CN LTC1059CS
N PACKAGE 14-LEAD PDIP S PACKAGE 14-LEAD PLASTIC SO $T_{JMAX} = 110^{\circ}\text{C}$, $\theta_{JA} = 130^{\circ}\text{C/W}$ (N) $T_{JMAX} = 110^{\circ}\text{C}$, $\theta_{JA} = 110^{\circ}\text{C/W}$ (S)		
J PACKAGE 14-LEAD CERDIP $T_{JMAX} = 150^{\circ}\text{C}$, $\theta_{JA} = 80^{\circ}\text{C/W}$ OBSOLETE PACKAGE Consider the N or S Package for Alternate Source		LTC1059ACJ LTC1059AMJ LTC1059CJ LTC1059MJ

Consult LTC Marketing for parts specified with wider operating temperature ranges.

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^{\circ}\text{C}$.(Complete Filter) $V_S = \pm 5\text{V}$, $T^2\text{L}$ clock input level unless otherwise specified.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Center Frequency Range, f_0	$f_0 \bullet Q \leq 400\text{kHz}$, Mode 1 $f_0 \bullet Q \leq 1.6\text{MHz}$, Mode 1 $f_0 \bullet Q \leq 250\text{kHz}$, Mode 3, $V_S = \pm 7.5\text{V}$ $f_0 \bullet Q \leq 1\text{MHz}$, Mode 3, $V_S = \pm 7.5\text{V}$		0.1 - 40k 0.1 - 18k 0.1 - 20k 0.1 - 16k		Hz Hz Hz Hz
Input Frequency Range			0 - 200k		Hz
Clock-to-Center Frequency Ratio	Mode 1, 50:1, $f_{CLK} = 250\text{kHz}$, $Q = 10$ Mode 1, 100:1, $f_{CLK} = 500\text{kHz}$, $Q = 10$	● ●		$50 \pm 0.8\%$ $100 \pm 0.8\%$	
Q Accuracy	Mode 1, 50:1 or 100:1, $f_0 = 5\text{kHz}$ $Q = 10$	●	± 0.5	5	%
f_0 Temperature Coefficient	Mode 1, $f_{CLK} < 500\text{kHz}$		5		ppm/ $^{\circ}\text{C}$
Q Temperature Coefficient	Mode 1, $f_{CLK} < 500\text{kHz}$, $Q = 10$		15		ppm/ $^{\circ}\text{C}$
DC Offset	V_{OS1}	●	2	15	mV
	V_{OS2}	●	3	30	mV
	V_{OS2}	●	3	40	mV
	V_{OS2}	●	6	60	mV
	V_{OS2}	●	6	80	mV
	V_{OS2}	●	2	20	mV
	V_{OS2}	●	2	30	mV
	V_{OS2}	●	4	40	mV
	V_{OS2}	●	4	60	mV
	V_{OS3}	●	2	20	mV
	V_{OS3}	●	2	30	mV
	V_{OS3}	●	4	40	mV
	V_{OS3}	●	4	60	mV

ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^\circ\text{C}$.

(Complete Filter) $V_S = \pm 5\text{V}$, $T^2\text{L}$ Clock Input Level unless otherwise specified.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
DC Lowpass Gain Accuracy	Mode 1, $R_1 = R_2 = 50\text{k}\Omega$	●	± 0.1	2	%
BP Gain Accuracy at f_0	Mode 1, $Q = 10$, $f_0 = 5\text{kHz}$		± 0.1		%
Clock Feedthrough	$f_{\text{CLK}} \leq 1\text{MHz}$		10		mV
Max Clock Frequency	Mode 1, $Q < 5$, $V_S \geq \pm 5\text{V}$		2		MHz
Power Supply Current		●	3.5	5.5 7	mA mA

(Complete Filter) $V_S = \pm 2.37\text{V}$ unless otherwise specified.

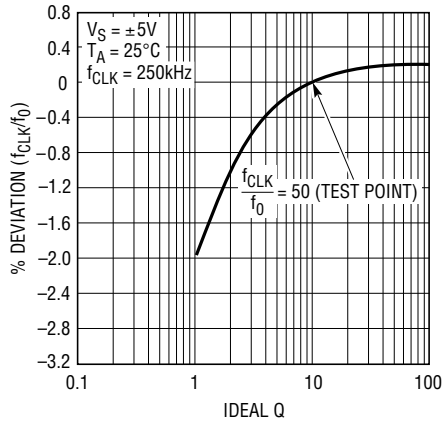
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Center Frequency Range	$f_0 \bullet Q \leq 120\text{kHz}$, Mode 1, 50:1 $f_0 \bullet Q \leq 120\text{kHz}$, Mode 3, 50:1		0.1 - 12k 0.1 - 10k		Hz Hz
Input Frequency Range			60k		Hz
Clock-to-Center Frequency Ratio	Mode 1, 50:1, $f_{\text{CLK}} = 250\text{kHz}$, $Q = 10$ Mode 1, 100:1, $f_{\text{CLK}} = 250\text{kHz}$, $Q = 10$		$50 \pm 0.8\%$ $100 \pm 0.8\%$		
Q Accuracy	Mode 1, $f_{\text{CLK}} = 250\text{kHz}$, $Q = 10$ 50:1 and 100:1		± 2		%
Max Clock Frequency			700		kHz
Power Supply Current			1.5	2.5	mA

(Internal Op Amps) The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at $T_A = 25^\circ\text{C}$.

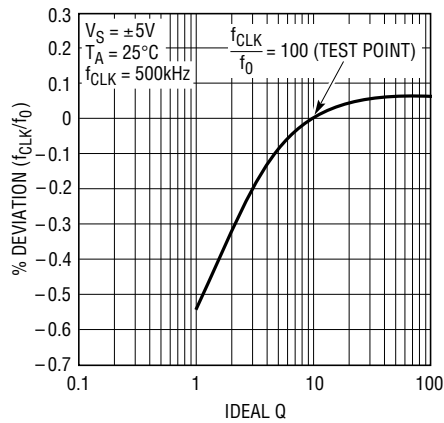
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage Range		± 2.375		± 8	V
Voltage Swings	$V_S = \pm 5\text{V}$, $R_L = 5\text{k}$ (Pins 1, 14) $R_L = 3.5\text{k}$ (Pins 2, 13)	● ± 3.8 ± 3.6	± 4.2		V V
Input Offset Voltage		●	1	15	mV
Input Bias Current			3		pA
Output Short-Circuit Current Source/Sink	$V_S = \pm 5\text{V}$ (N Package) $V_S = \pm 5\text{V}$ (S Package)		40/3 25/3		mA mA
DC Open Loop Gain	$V_S = \pm 5\text{V}$		80		dB
GBW	$V_S = \pm 5\text{V}$		2		MHz
Slew Rate	$V_S = \pm 5\text{V}$		7		V/ μs

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

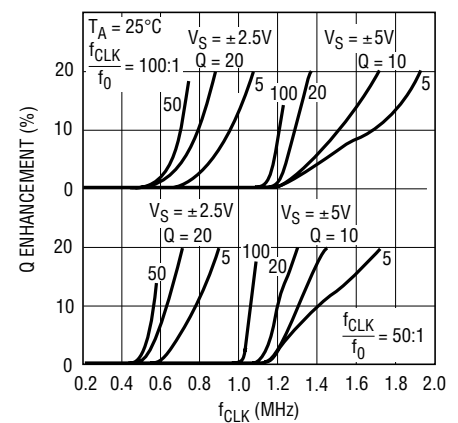
TYPICAL PERFORMANCE CHARACTERISTICS

Graph 1. Mode 1:
(f_{CLK}/f_0) Deviation vs Q

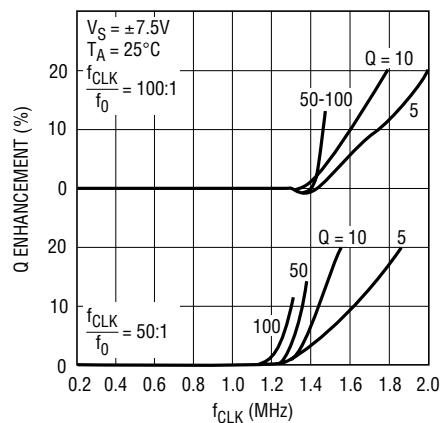
1060 G01

Graph 2. Mode 1:
(f_{CLK}/f_0) Deviation vs Q

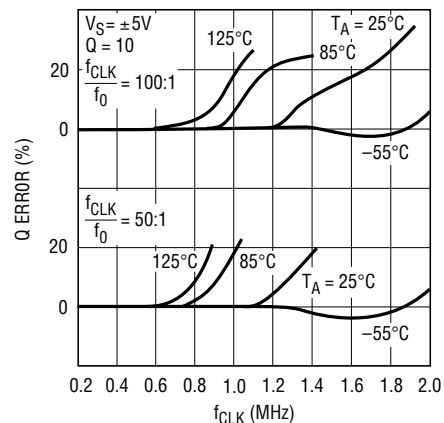
1060 G02

Graph 3. Mode 1: Q Error
vs Clock Frequency

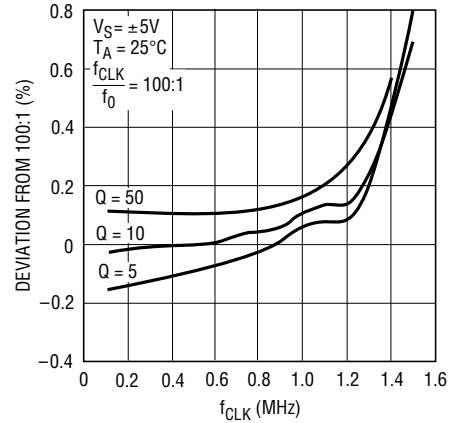
1060 G03

Graph 4. Mode 1: Q Error
vs Clock Frequency

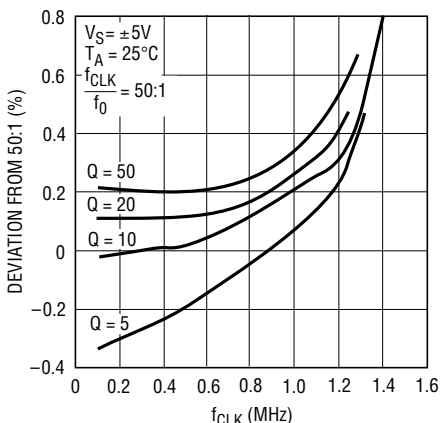
1059 G04

Graph 5. Mode 1: Measured Q
vs f_{CLK} and Temperature

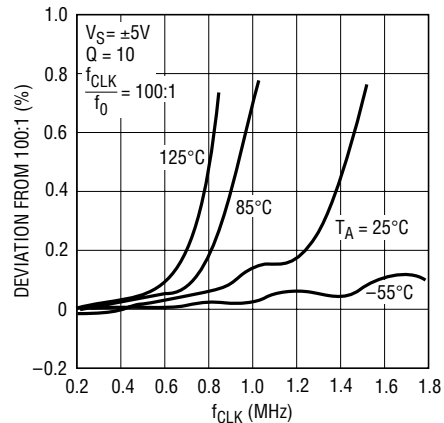
1059 G05

Graph 6. Mode 1: (f_{CLK}/f_0)
vs f_{CLK} and Q

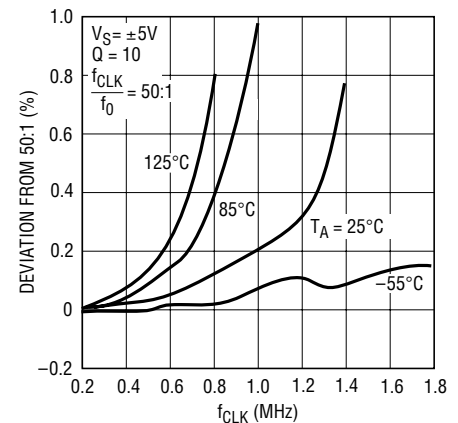
1059 G06

Graph 7. Mode 1: (f_{CLK}/f_0)
vs f_{CLK} and Q

1059 G07

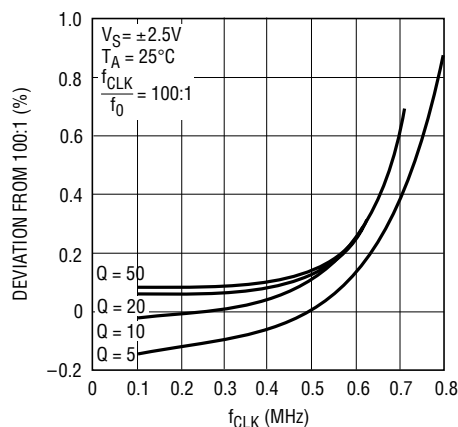
Graph 8. Mode 1: (f_{CLK}/f_0)
vs f_{CLK} and Temperature

1059 G08

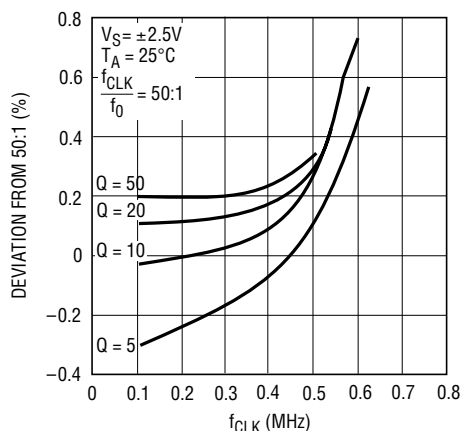
Graph 9. Mode 1: (f_{CLK}/f_0)
vs f_{CLK} and Temperature

1059 G09

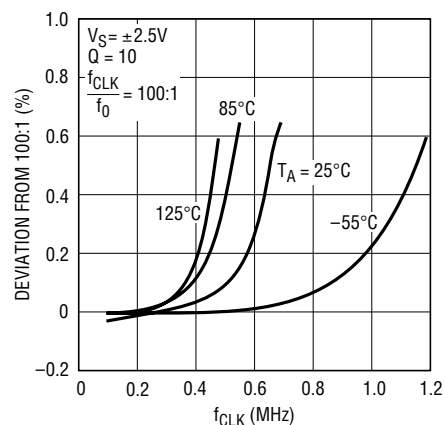
TYPICAL PERFORMANCE CHARACTERISTICS

Graph 10. Mode 1: (f_{CLK}/f_0) vs f_{CLK} and Q

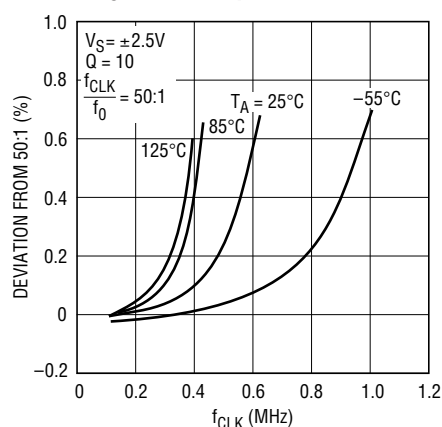
1059 G10

Graph 11. Mode 1: (f_{CLK}/f_0) vs f_{CLK} and Q

1059 G11

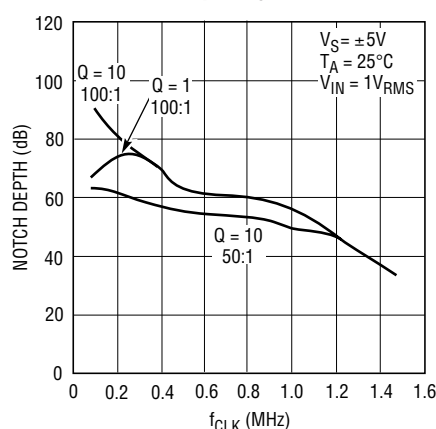
Graph 12. Mode 1: (f_{CLK}/f_0) vs f_{CLK} and Temperature

1059 • G12

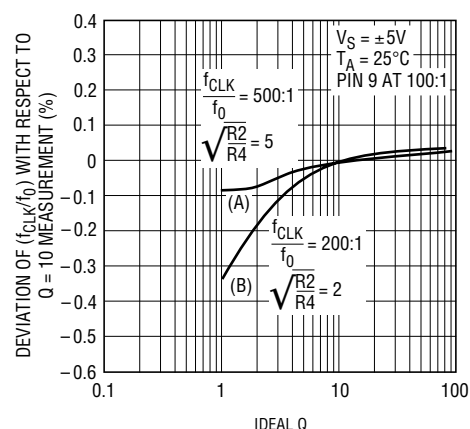
Graph 13. Mode 1: (f_{CLK}/f_0) vs f_{CLK} and Temperature

1059 G13

Graph 14. Mode 1: Notch Depth vs Clock Frequency

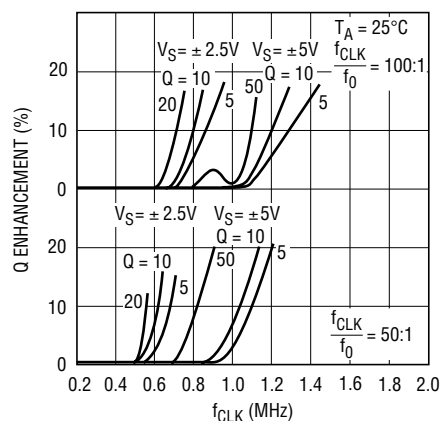


1059 G14

Graph 15. Mode 3: Deviation of (f_{CLK}/f_0) with Respect to Q = 10 Measurement

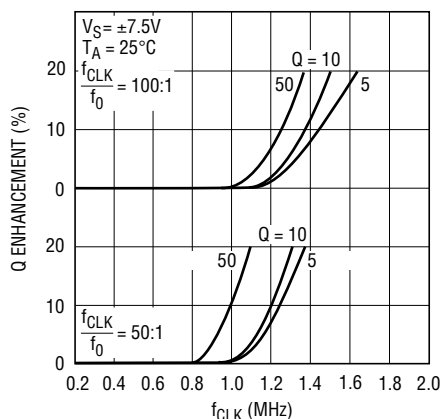
1059 G15

Graph 16. Mode 3: Q Error vs Clock Frequency

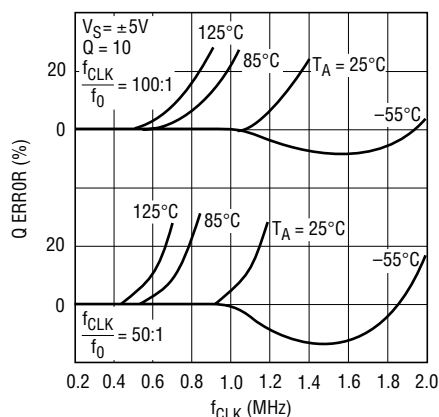


1059 G16

Graph 17. Mode 3 (R2 = R4): Q Error vs Clock Frequency



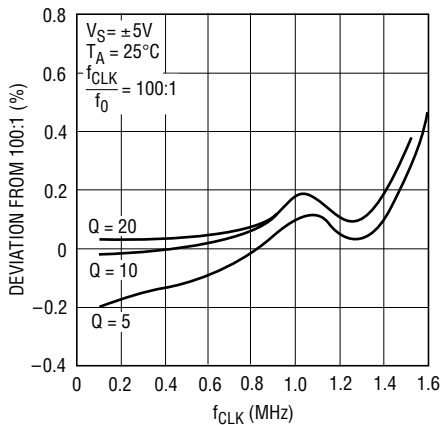
1059 G17

Graph 18. Mode 3 (R2 = R4): Measured Q vs f_{CLK} and Temperature

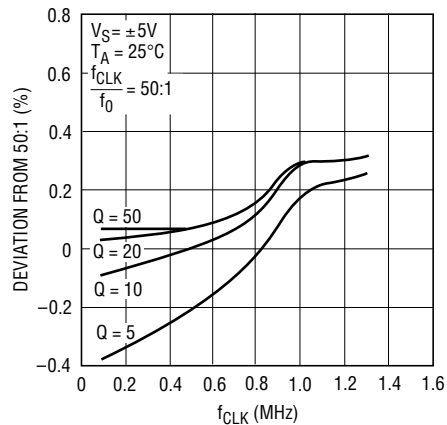
1059 G18

1059fd

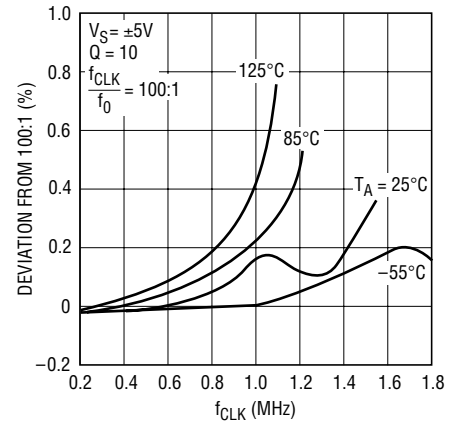
TYPICAL PERFORMANCE CHARACTERISTICS

Graph 19. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Q

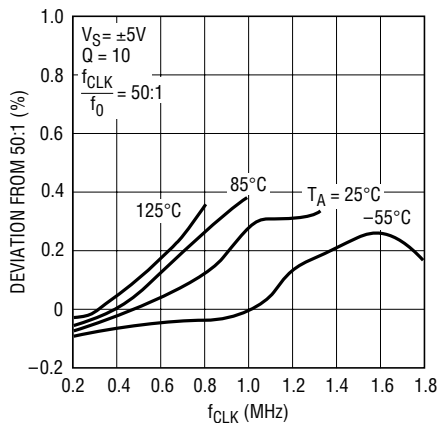
1059 G19

Graph 20. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Q

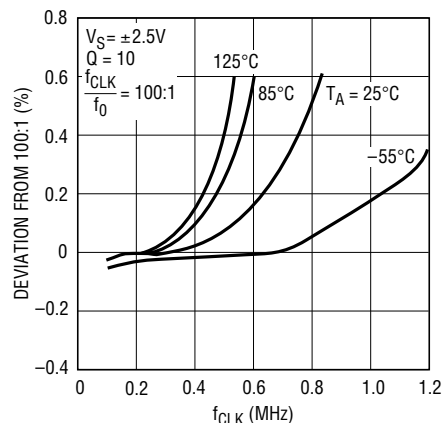
1059 G20

Graph 21. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Temperature

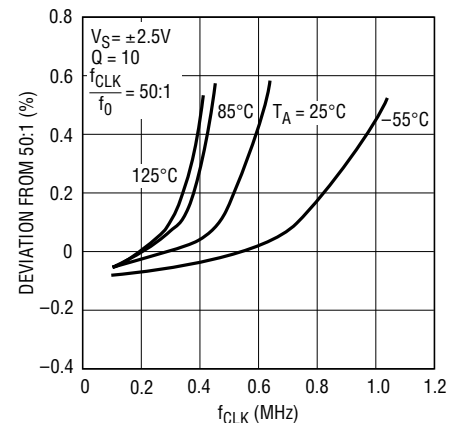
1059 G21

Graph 22. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Temperature

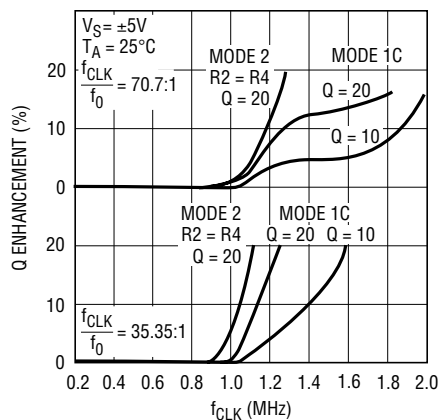
1059 G22

Graph 23. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Temperature

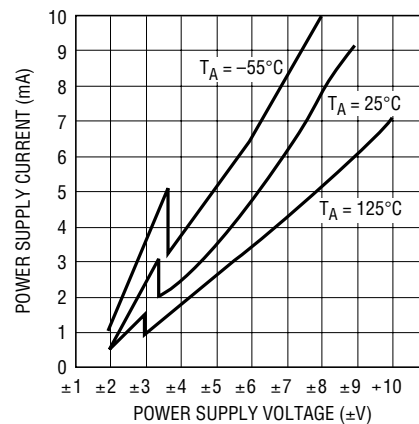
1059 G23

Graph 24. Mode 3 (R2 = R4):
(f_{CLK}/f_0) vs f_{CLK} and Temperature

1059 G24

Graph 25. Mode 1c (R5 = 0),
Mode 2 (R2 = R4): Q Error vs
Clock Frequency

1059 G25

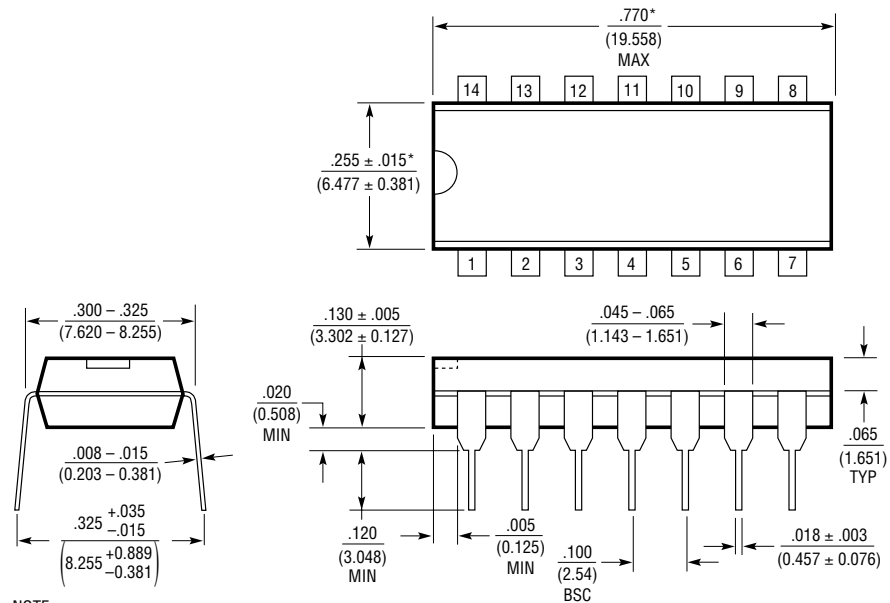
Graph 26. Supply Current
vs Supply Voltage

1059 G26

1059fd

PACKAGE DESCRIPTION

N Package 14-Lead PDIP (Narrow .300 Inch) (Reference LTC DWG # 05-08-1510)

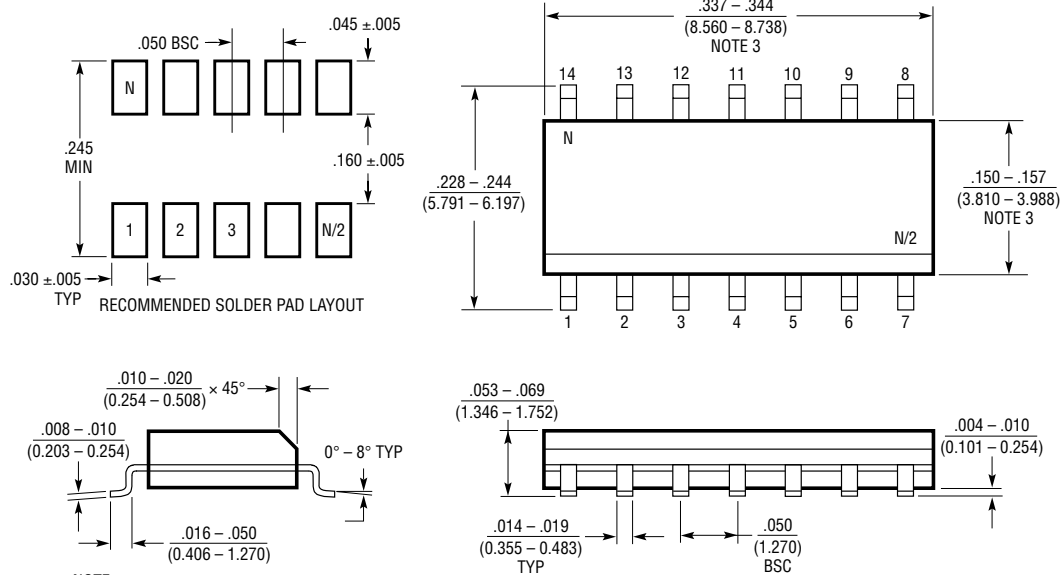


NOTE:

1. DIMENSIONS ARE $\frac{\text{INCHES}}{\text{MILLIMETERS}}$ *THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .010 INCH (0.254mm)

N14 1002

S Package 14-Lead Plastic Small Outline (Narrow .150 Inch) (Reference LTC DWG # 05-08-1610)



NOTE:

1. DIMENSIONS IN $\frac{\text{INCHES}}{\text{MILLIMETERS}}$

2. DRAWING NOT TO SCALE

3. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED .006" (0.15mm)

S14 0502

1059fd