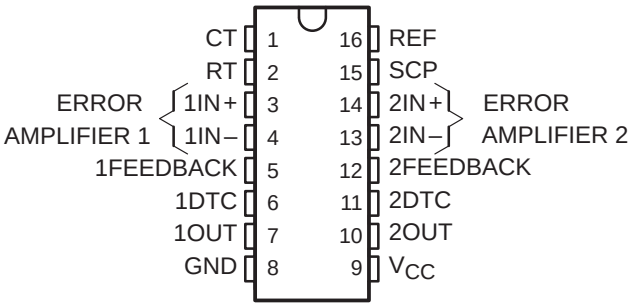
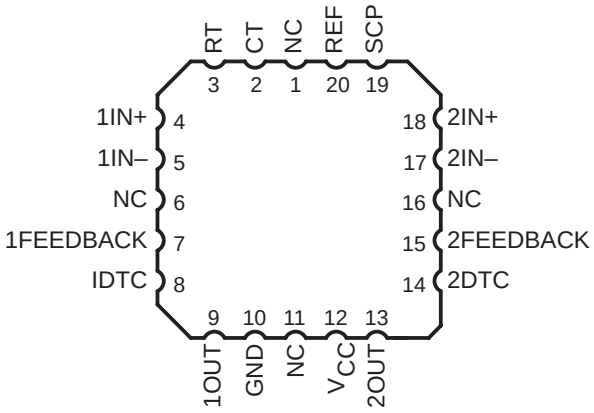
SLVS024E – FEBRUARY 1983 – REVISED NOVEMBER 1999

- **Complete PWM Power Control Circuitry**
- **Completely Synchronized Operation**
- **Internal Undervoltage Lockout Protection**
- **Wide Supply Voltage Range**
- **Internal Short-Circuit Protection**
- **Oscillator Frequency . . . 500 kHz Max**
- **Variable Dead Time Provides Control Over Total Range**
- **Internal Regulator Provides a Stable 2.5-V Reference Supply**
- **Available in Q-Temp Automotive**
  HighRel Automotive Applications
  Configuration Control / Print Support
  Qualification to Automotive Standards

D, DB, N, NS, PW, OR J PACKAGE
(TOP VIEW)



FK PACKAGE
(TOP VIEW)



description

The TL1451A incorporates on a single monolithic chip all the functions required in the construction of two pulse-width-modulation (PWM) control circuits. Designed primarily for power-supply control, the TL1451A contains an on-chip 2.5-V regulator, two error amplifiers, an adjustable oscillator, two dead-time comparators, undervoltage lockout circuitry, and dual common-emitter output transistor circuits.

The uncommitted output transistors provide common-emitter output capability for each controller. The internal amplifiers exhibit a common-mode voltage range from 1.04 V to 1.45 V. The dead-time control (DTC) comparator has no offset unless externally altered and can provide 0% to 100% dead time. The on-chip oscillator can be operated by terminating RT and CT. During low V_{CC} conditions, the undervoltage lockout control circuit feature locks the outputs off until the internal circuitry is operational.

The TL1451AC is characterized for operation from –20°C to 85°C. The TL1451AQ is characterized for operation from –40°C to 125°C. The TL1451AM is characterized for operation from –55°C to 125°C.

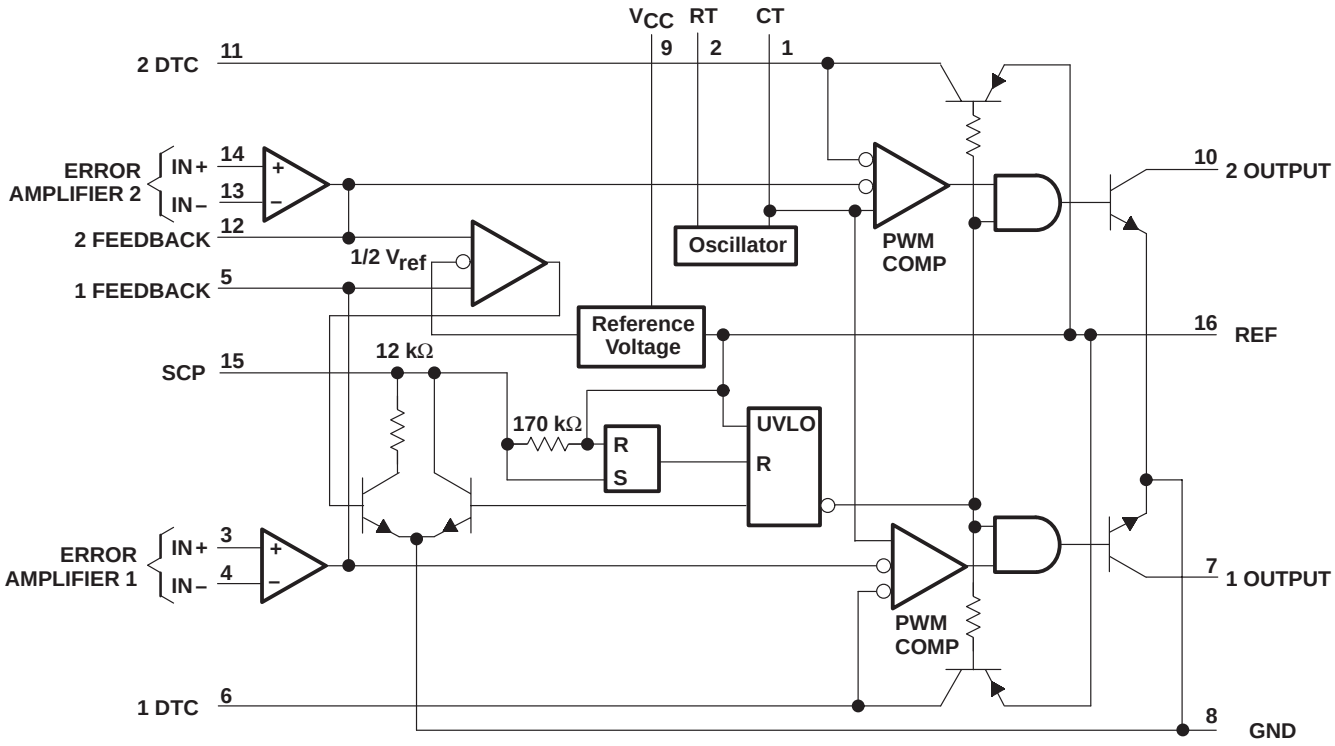
AVAILABLE OPTIONS

T_A	PACKAGED DEVICES						
	SMALL OUTLINE (D)	SMALL OUTLINE (DB)†	PLASTIC DIP (N)	SMALL OUTLINE (NS)	TSSOP (PW)†	CHIP CARRIER (FK)	CERAMIC DIP (J)
–20°C to 85°C	—	TL1451ACDB	TL1451ACN	TL1451ACNS	TL1451ACPW	—	—
–40°C to 125°C	TL1451AQD	—	—	—	—	—	—
–55°C to 125°C	—	—	—	—	—	TL1451AMFK	TL1451AMJ

† The DB and PW packages are only available left-end taped and reeled (add LE suffix, i.e., TL1451ACPWLE).

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

functional block diagram



COMPONENT COUNT

Resistors	65
Capacitors	8
Transistors	105
JFETs	18

absolute maximum ratings over operating free-air temperature range†

Supply voltage, V_{CC} . . . . . 51 V
Amplifier input voltage, V_I . . . . . 20 V
Collector output voltage, V_O . . . . . 51 V
Collector output current, I_O . . . . . 21 mA
Continuous power total dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A C suffix . . . . . –20°C to 85°C
Q suffix . . . . . –40°C to 125°C
M suffix . . . . . –55°C to 125°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	1088 mW	8.7 mW/°C	696 mW	566 mW	218 mW
DB	775 mW	6.2 mW/°C	496 mW	403 mW	—
N	1000 mW	8.0 mW/°C	640 mW	520 mW	—
NS	500 mW	4.0 mW/°C	320 mW	260 mW	—
PW	838 mW	6.7 mW/°C	536 mW	436 mW	168 mW
FK	1375 mW	11.0 mW/°C	880 mW	715 mW	275 mW
J	1375 mW	11.0 mW/°C	880 mW	715 mW	275 mW

recommended operating conditions

		MIN	MAX	UNIT
Supply voltage, V_{CC}		3.6	50	V
Amplifier input voltage, V_I		1.05	1.45	V
Collector output voltage, V_O			50	V
Collector output current, I_O			20	mA
Current into feedback terminal			45	μA
Feedback resistor, R_F		100		kΩ
Timing capacitor, C_T		150	15000	pF
Timing resistor, R_T		5.1	100	kΩ
Oscillator frequency		1	500	kHz
Operating free-air temperature, T_A	C suffix	–20	85	°C
	Q suffix	–40	125	
	M suffix	–55	125	

electrical characteristics over recommended operating free-air temperature range, V_{CC} = 6 V, f = 200 kHz (unless otherwise noted)

reference section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Output voltage (pin 16)	I_O = 1 mA	2.4	2.5	2.6	V
Output voltage change with temperature	T_A = –20°C to 25°C		–0.1%	±1%	
	T_A = 25°C to 85°C		–0.2%	±1%	
Input voltage regulation	V_{CC} = 3.6 V to 40 V		2	12.5	mV
Output voltage regulation	I_O = 0.1 mA to 1 mA		1	7.5	mV
Short-circuit output current	V_O = 0	3	10	30	mA

† All typical values are at T_A = 25°C.

undervoltage lockout section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Upper threshold voltage (V_{CC})	$I_{O(ref)}$ = 0.1 mA, T_A = 25°C		2.72		V
Lower threshold voltage (V_{CC})			2.6		V
Hysteresis (V_{CC})		80	120		mV
Reset threshold voltage (V_{CC})		1.5	1.9		V

† All typical values are at T_A = 25°C.

short-circuit protection control section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Input threshold voltage (SCP)	T_A = 25°C	0.65	0.7	0.75	V
Standby voltage (SCP)	No pullup	140	185	230	mV
Latched input voltage (SCP)	No pullup		60	120	mV
Input (source) current	V_I = 0.7 V, T_A = 25°C	–10	–15	–20	µA
Comparator threshold voltage (FEEDBACK)			1.18		V

† All typical values are at T_A = 25°C.

oscillator section

PARAMETER	TEST CONDITIONS	TL1451C			UNIT
		MIN	TYP†	MAX	
Frequency	C_T = 330 pF, R_T = 10 kΩ		200		kHz
Standard deviation of frequency	C_T = 330 pF, R_T = 10 kΩ		10%		
Frequency change with voltage	V_{CC} = 3.6 V to 40 V		1%		
Frequency change with temperature	T_A = –20°C to 25°C		–0.4%	±2%	
	T_A = 25°C to 85°C		–0.2%	±2%	

† All typical values are at T_A = 25°C.

dead-time control section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Input bias current (DTC)				1	μA
Latch mode (source) current (DTC)	T_A = 25°C	–80	–145		μA
Latched input voltage (DTC)	I_O = 40 μA	2.3			V
Input threshold voltage at f = 10 kHz (DTC)	Zero duty cycle		2.05	2.25	V
	Maximum duty cycle	1.2	1.45		

† All typical values are at T_A = 25°C.

error-amplifier section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Input offset voltage	V_O (FEEDBACK) = 1.25 V			±6	mV
Input offset current	V_O (FEEDBACK) = 1.25 V			±100	nA
Input bias current	V_O (FEEDBACK) = 1.25 V		160	500	nA
Common-mode input voltage range	V_{CC} = 3.6 V to 40 V	1.05 to 1.45			V
Open-loop voltage amplification	R_F = 200 kΩ	70	80		dB
Unity-gain bandwidth			1.5		MHz
Common-mode rejection ratio		60	80		dB
Positive output voltage swing		V_{ref}–0.1			V
Negative output voltage swing				1	V
Output (sink) current (FEEDBACK)	V_{ID} = –0.1 V, V_O = 1.25 V	0.5	1.6		mA
Output (source) current (FEEDBACK)	V_{ID} = 0.1 V, V_O = 1.25 V	–45	–70		μA

† All typical values are at T_A = 25°C.

output section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Collector off-state current	V_O = 50 V			10	μA
Output saturation voltage	I_O = 10 mA		1.2	2	V
Short-circuit output current	V_O = 6 V		90		mA

† All typical values are at T_A = 25°C.

pwm comparator section

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Input threshold voltage at f = 10 kHz (FEEDBACK)	Zero duty cycle		2.05	2.25	V
	Maximum duty cycle	1.2	1.45		

† All typical values are at T_A = 25°C.

total device

PARAMETER	TEST CONDITIONS	TL1451AC			UNIT
		MIN	TYP†	MAX	
Standby supply current	Off-state		1.3	1.8	mA
Average supply current	R_T = 10 kΩ		1.7	2.4	mA

† All typical values are at T_A = 25°C.

electrical characteristics over recommended operating free-air temperature range, V_{CC} = 6 V, f = 200 kHz (unless otherwise noted)

reference section

PARAMETER	TEST CONDITIONS		TL1451AQ, TL1451AM			UNIT
			MIN	TYP†	MAX	
Output voltage (pin 16)	I_O = 1 mA	T_A = 25°C	2.40	2.50	2.60	V
		T_A = MIN and 125°C	2.35	2.46	2.65	
Output voltage change with temperature				–0.63%	*±4%	
Input voltage regulation	V_{CC} = 3.6 V to 40 V	T_A = 25°C		2.0	12.5	mV
		T_A = 125°C		0.7	15	
		T_A = MIN		0.3	30	
Output voltage regulation	I_O = 0.1 mA to 1 mA	T_A = 25°C		1.0	7.5	mV
		T_A = 125°C		0.3	14	
		T_A = MIN		0.3	20	
Short-circuit output current	V_O = 0		3	10	30	mA

*These parameters are not production tested.
† All typical values are at T_A = 25°C unless otherwise indicated.

undervoltage lockout section

PARAMETER	TEST CONDITIONS		TL1451AQ, TL1451AM			UNIT
			MIN	TYP†	MAX	
Upper threshold voltage (V_{CC})		T_A = 25°C		2.72		V
		T_A = 125°C		1.70		
		T_A = MIN		3.15		
Lower threshold voltage (V_{CC})		T_A = 25°C		2.60		V
		T_A = 125°C		1.65		
		T_A = MIN		3.09		
Hysteresis (V_{CC})		T_A = 25°C	80	120		mV
		T_A = 125°C	10	50		
		T_A = MIN	10	60		
Reset threshold voltage (V_{CC})		T_A = 25°C	1.50			V
		T_A = 125°C	0.95			
		T_A = MIN	1.50			

† All typical values are at T_A = 25°C unless otherwise indicated.

short-circuit protection control section

PARAMETER	TEST CONDITIONS	TL1451AQ, TL1451AM			UNIT
		MIN	TYP†	MAX	
Input threshold voltage (SCP)	T_A = 25°C	650	700	750	mV
	T_A = 125°C	400	478	550	
	T_A = MIN	800	880	950	
Standby voltage (SCP)		140	185	230	mV
Latched input voltage (SCP)	T_A = 25°C		60	120	mV
	T_A = 125°C		70	120	
	T_A = MIN		60	120	
Equivalent timing resistance			170		kΩ
Comparator threshold voltage (FEEDBACK)			1.18		V

† All typical values are at T_A = 25°C unless otherwise indicated.

oscillator section

PARAMETER	TEST CONDITIONS		TL1451AQ, TL1451AM			UNIT
			MIN	TYP†	MAX	
Frequency	C_T = 330 pF, R_T = 10 kΩ	T_A = 25°C		200		kHz
		T_A = 125°C		195		
		T_A = MIN		193		
Standard deviation of frequency	C_T = 330 pF,	R_T = 10 kΩ		2%		
Frequency change with voltage	V_{CC} = 3.6 V to 40 V	T_A = 25°C		1%		
		T_A = 125°C		1%		
		T_A = MIN		3%		
Frequency change with temperature				1.37%	*±10%	

*These parameters are not production tested.
† All typical values are at T_A = 25°C unless otherwise indicated.

dead-time control section

PARAMETER	TEST CONDITIONS	TL1451AQ, TL1451AM			UNIT
		MIN	TYP†	MAX	
Input bias current (DTC)	T_A = 25°C			1	μA
	T_A = MIN and 125°C			3	
Latch mode (source) current (DTC)		–80	–145		μA
Latched input voltage (DTC)	T_A = 25°C	2.30			V
	T_A = 125°C	2.22	2.32		
	T_A = MIN	2.28	2.40		
Input threshold voltage at f = 10 kHz (DTC)	Zero duty cycle		2.05	*2.25	V
	Maximum duty cycle	*1.20	1.45		

*These parameters are not production tested.
† All typical values are at T_A = 25°C unless otherwise indicated.

error-amplifier section

PARAMETER	TEST CONDITIONS		TL1451AQ, TL1451AM			UNIT
			MIN	TYP†	MAX	
Input offset voltage	V_O (FEEDBACK) = 1.25 V	T_A = 25°C			±6	mV
		T_A = 125°C			±10	
		T_A = MIN			±12	
Input offset current	V_O (FEEDBACK) = 1.25 V	T_A = 25°C			±100	nA
		T_A = 125°C			±100	
		T_A = MIN			±200	
Input bias current	V_O (FEEDBACK) = 1.25 V	T_A = 25°C		160	500	nA
		T_A = 125°C		100	500	
		T_A = MIN		142	700	
Common-mode input voltage range	V_{CC} = 3.6 V to 40 V		1.05 to 1.45			V
Open-loop voltage amplification	R_F = 200 kΩ	T_A = 25°C	70	80		dB
		T_A = 125°C	70	80		
		T_A = MIN	64	80		
Unity-gain bandwidth				1.5		MHz
Common-mode rejection ratio			60	80		dB
Positive output voltage swing			2			V
Negative output voltage swing					1	V
Output (sink) current (FEEDBACK)	V_{ID} = –0.1 V, V_O = 1.25 V	T_A = 25°C	0.5	1.6		mA
		T_A = 125°C	0.4	1.8		
		T_A = MIN	0.3	1.7		
Output (source) current (FEEDBACK)	V_{ID} = 0.1 V, V_O = 1.25 V	T_A = 25°C	–45	–70		µA
		T_A = 125°C	–25	–50		
		T_A = MIN	–15	–70		

† All typical values are at T_A = 25°C unless otherwise indicated.

output section

PARAMETER	TEST CONDITIONS	TL1451AQ, TL1451AM			UNIT
		MIN	TYP†	MAX	
Collector off-state current	V_O = 50 V			10	µA
Output saturation voltage	T_A = 25°C		1.20	2.0	V
	T_A = 125°C		1.60	2.4	
	T_A = MIN		1.36	2.2	
Short-circuit output current	V_O = 6 V		90		mA

† All typical values are at T_A = 25°C unless otherwise indicated.

pwm comparator section

PARAMETER	TEST CONDITIONS	TL1451AQ, TL1451AM			UNIT
		MIN	TYP†	MAX	
Input threshold voltage at f = 10 kHz (FEEDBACK)	Zero duty cycle		2.05	*2.25	V
	Maximum duty cycle	*1.20	1.45		

*These parameters are not production tested.
† All typical values are at T_A = 25°C unless otherwise indicated.

total device

PARAMETER	TEST CONDITIONS	TL1451AQ, TL1451AM			UNIT
		MIN	TYP†	MAX	
Standby supply current	Off-state		1.3	1.8	mA
Average supply current	R_T = 10 kΩ		1.7	2.4	mA

† All typical values are at T_A = 25°C unless otherwise indicated.

PARAMETER MEASUREMENT INFORMATION

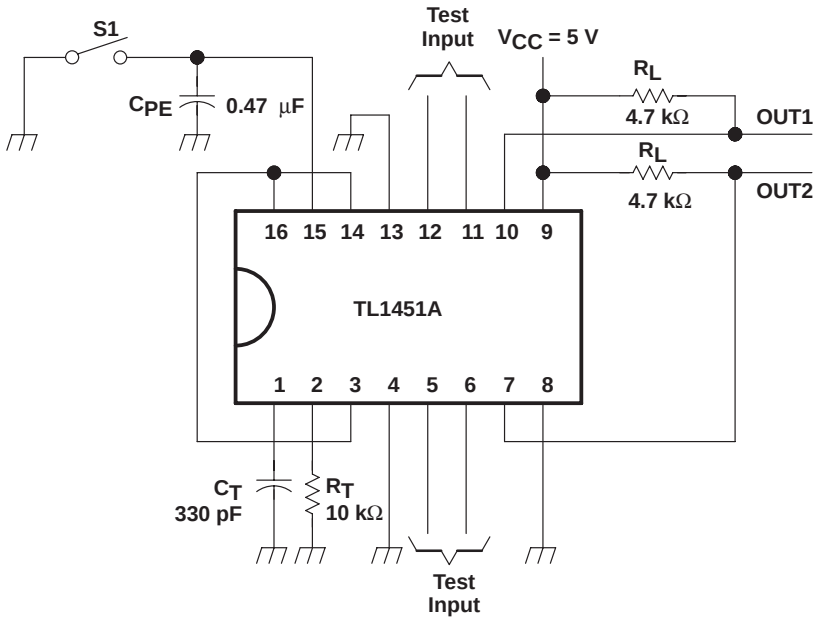
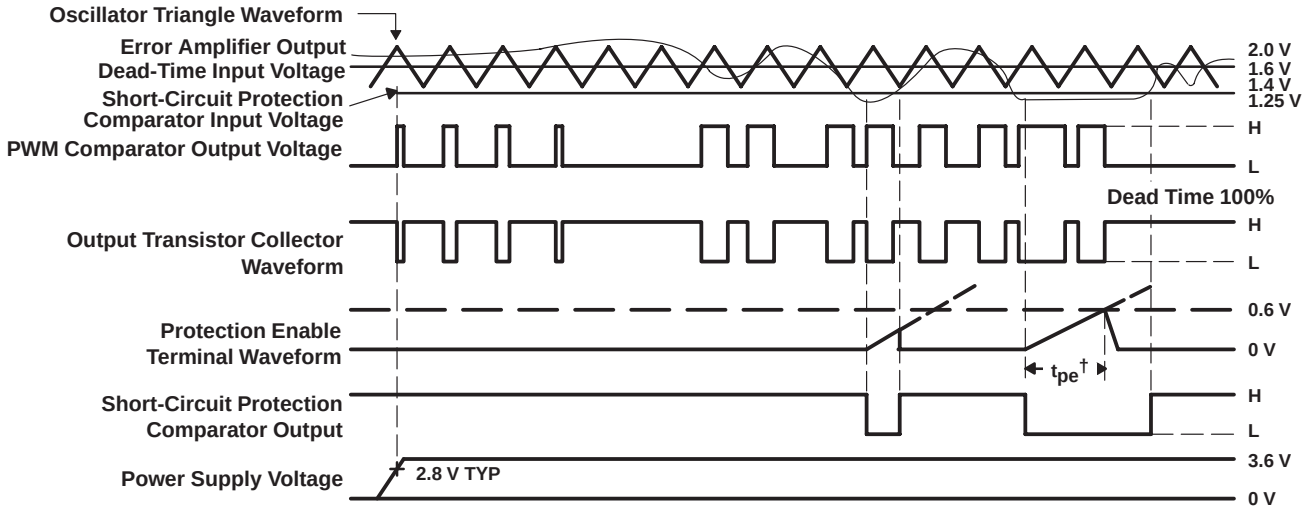


Figure 1. Test Circuit



† Protection Enable Time, $t_{pe} = (0.051 \times 10^6 \times C_{pe})$ in seconds

Figure 2. TL1451A Timing Diagram

TYPICAL CHARACTERISTICS

TRIANGLE OSCILLATOR FREQUENCY vs TIMING RESISTANCE

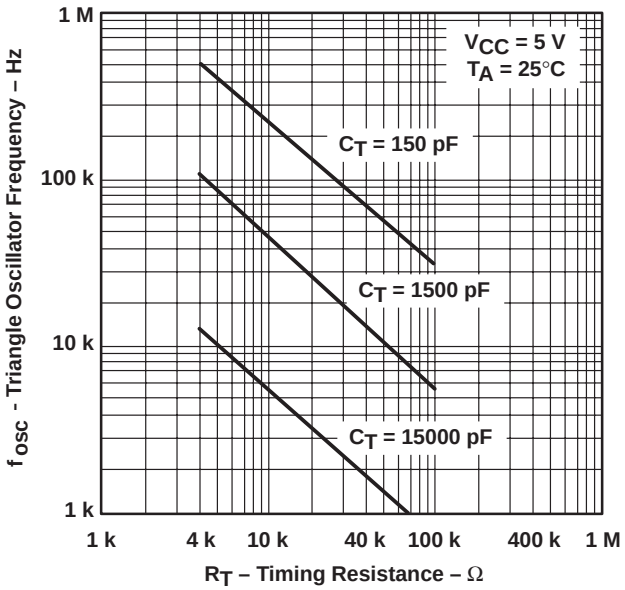


Figure 3

OSCILLATOR FREQUENCY VARIATION vs FREE-AIR TEMPERATURE

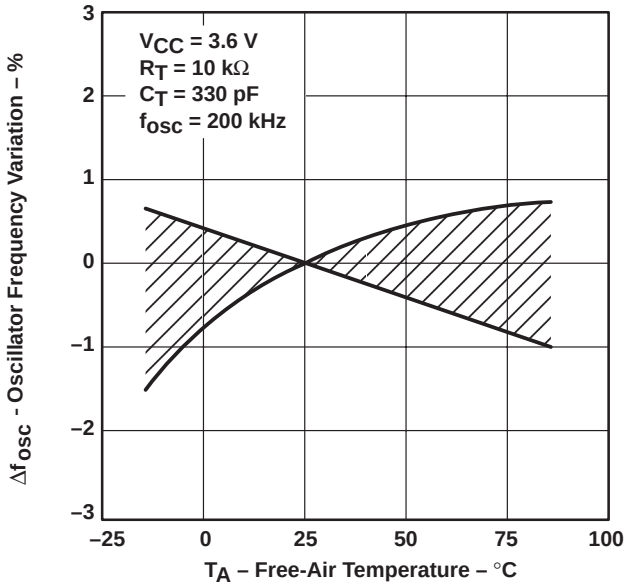


Figure 4

TRIANGLE WAVEFORM SWING VOLTAGE vs TIMING CAPACITANCE

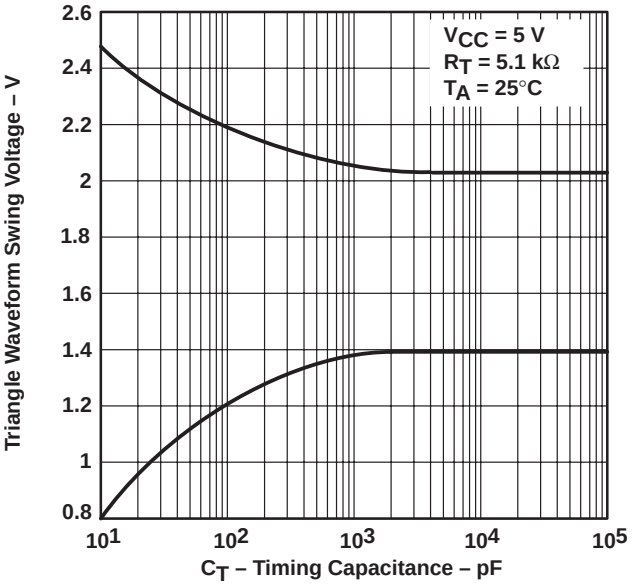


Figure 5

TRIANGLE WAVEFORM PERIOD vs TIMING CAPACITANCE

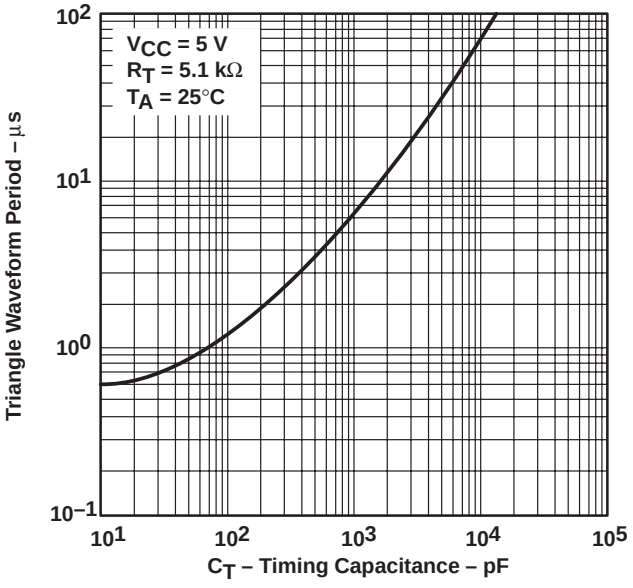


Figure 6

TYPICAL CHARACTERISTICS

REFERENCE OUTPUT VOLTAGE VARIATION vs FREE-AIR TEMPERATURE

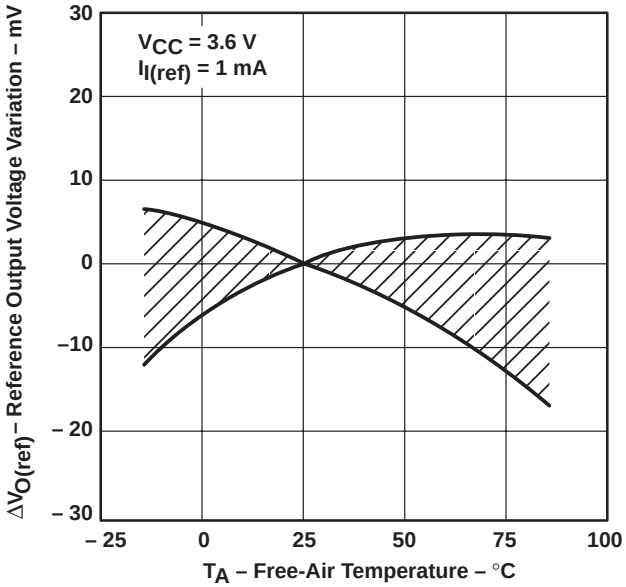


Figure 7

REFERENCE OUTPUT VOLTAGE VARIATION vs FREE-AIR TEMPERATURE

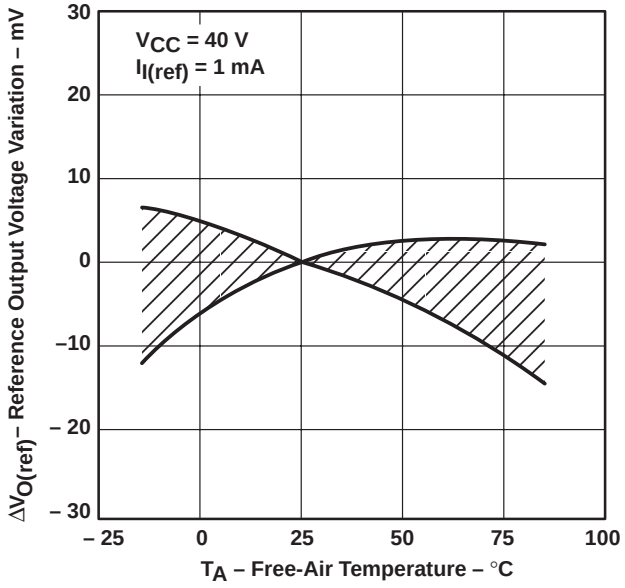


Figure 8

REFERENCE OUTPUT VOLTAGE vs SUPPLY VOLTAGE

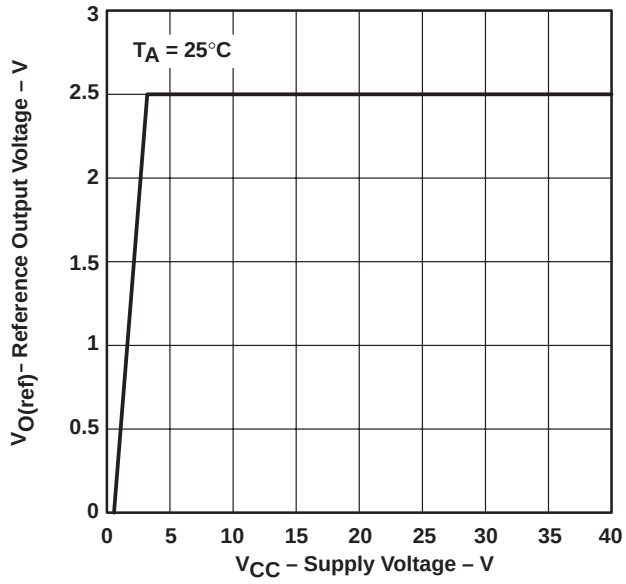


Figure 9

DROPOUT VOLTAGE VARIATION vs FREE-TEMPERATURE

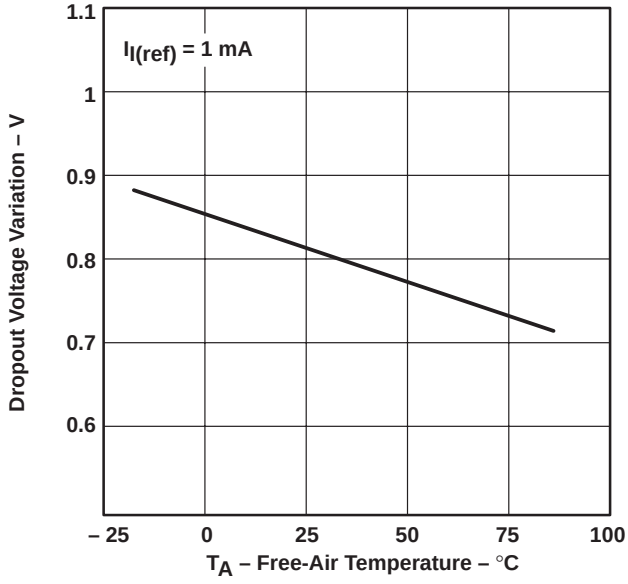


Figure 10

TYPICAL CHARACTERISTICS

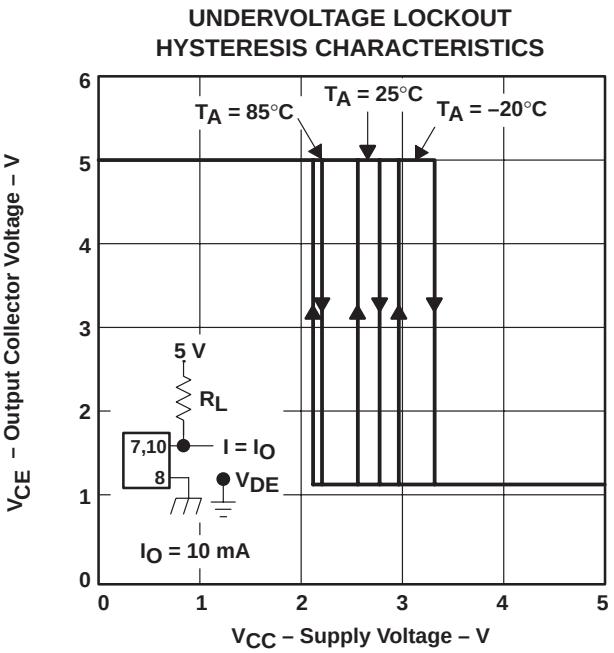


Figure 11

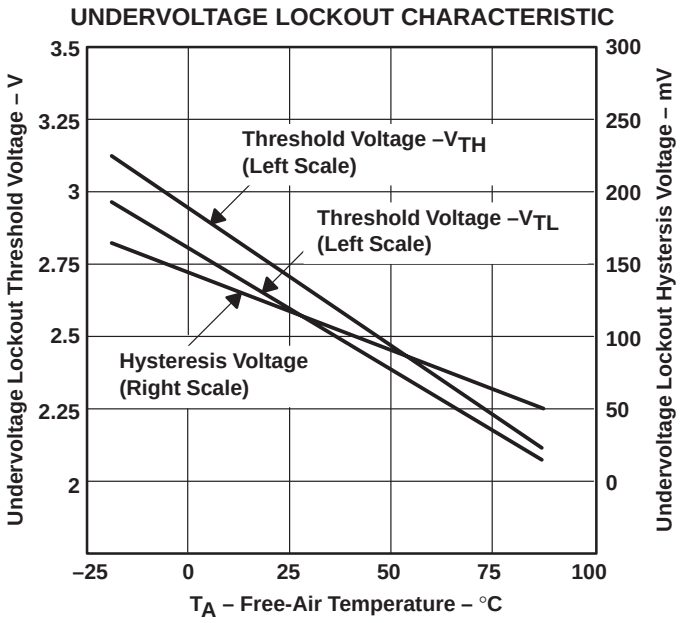


Figure 12

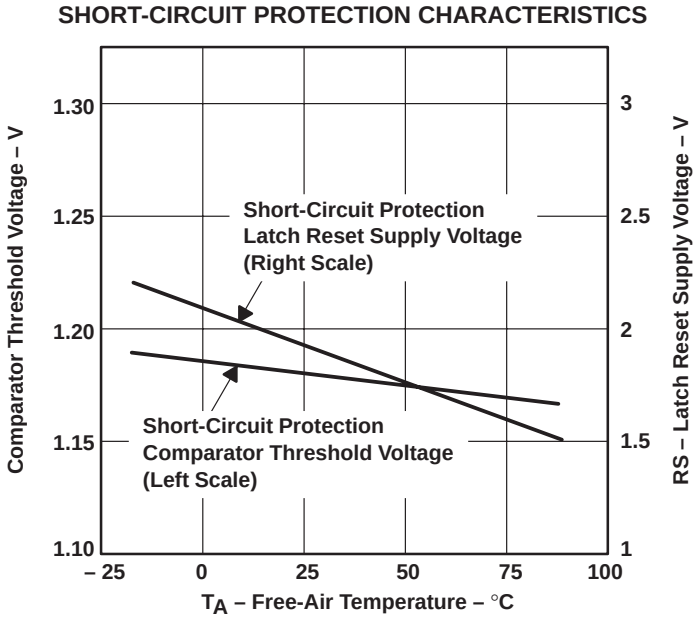
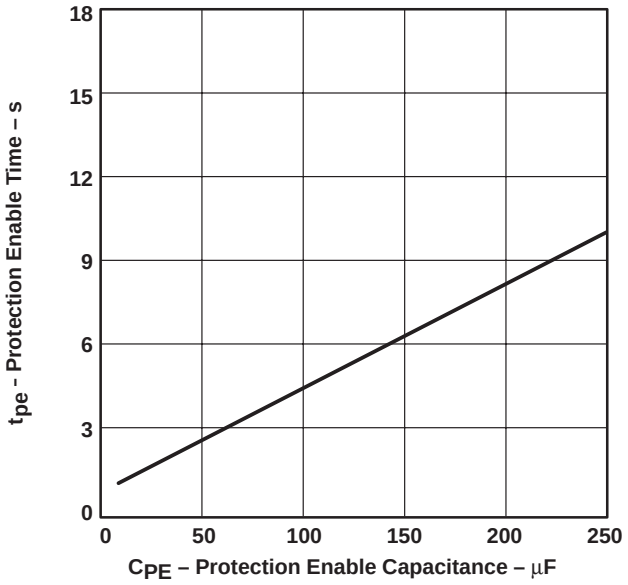


Figure 13

TYPICAL CHARACTERISTICS

PROTECTION ENABLE TIME
vs
PROTECTION ENABLE CAPACITANCE



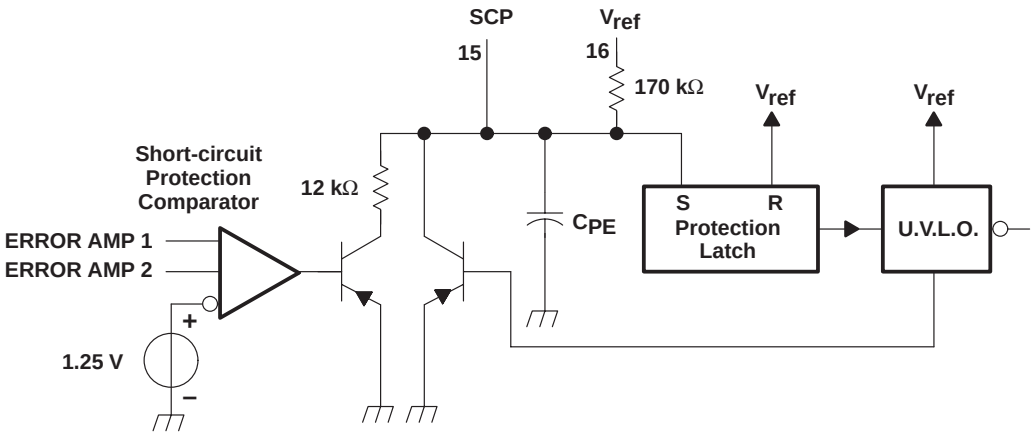


Figure 14

TYPICAL CHARACTERISTICS

ERROR AMP MAXIMUM OUTPUT VOLTAGE SWING vs FREQUENCY

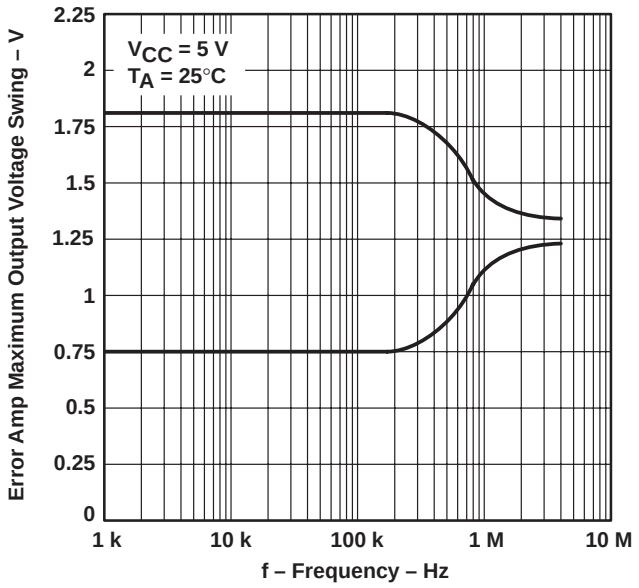


Figure 15

OPEN-LOOP VOLTAGE AMPLIFICATION vs FREQUENCY

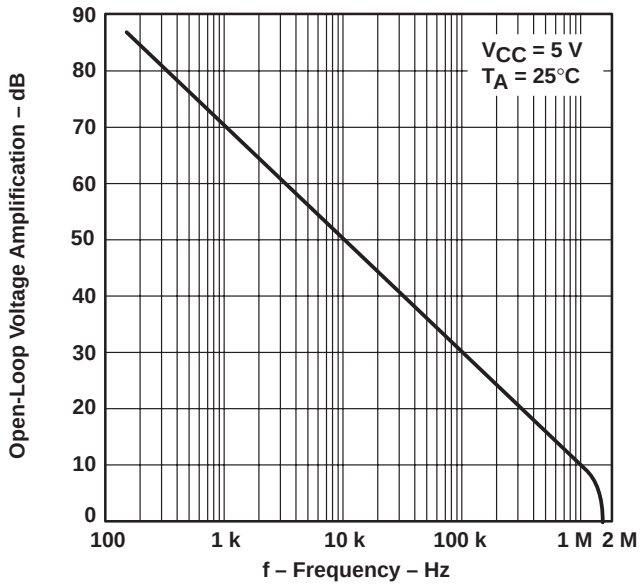


Figure 16

GAIN (AMPLIFIER IN UNITY-GAIN CONFIGURATION) vs FREQUENCY

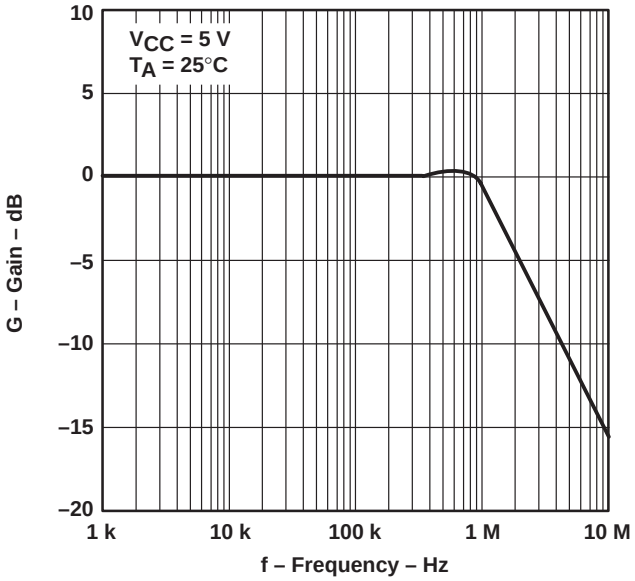
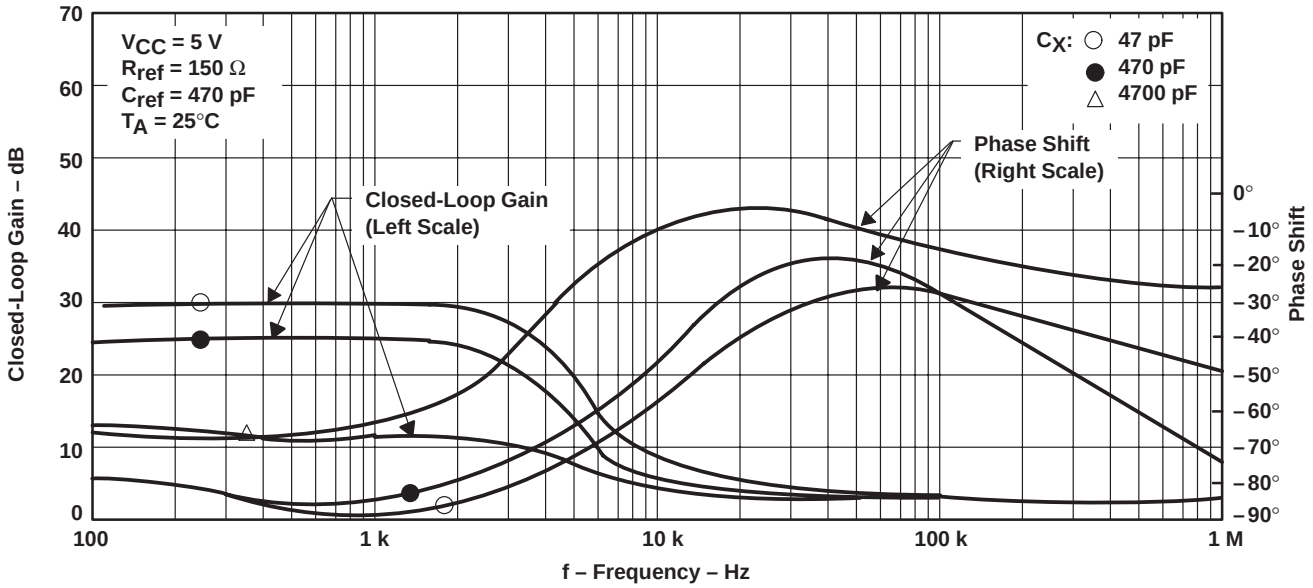
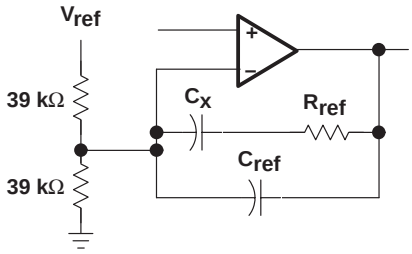


Figure 17

TYPICAL CHARACTERISTICS

**CLOSED-LOOP GAIN AND PHASE SHIFT
vs
FREQUENCY**



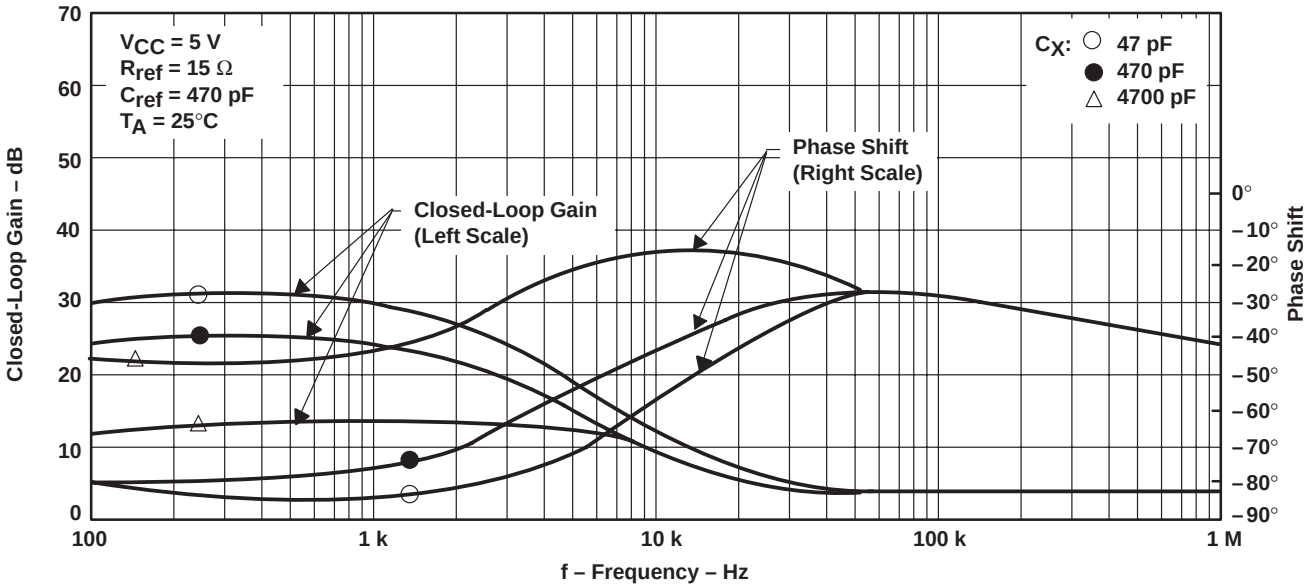


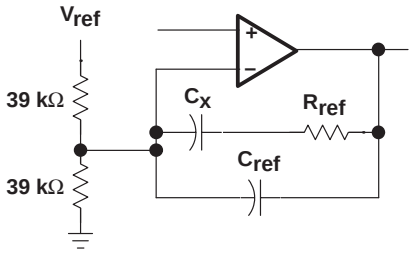
Test Circuit

Figure 18

TYPICAL CHARACTERISTICS

**CLOSED-LOOP GAIN AND PHASE SHIFT
vs
FREQUENCY**



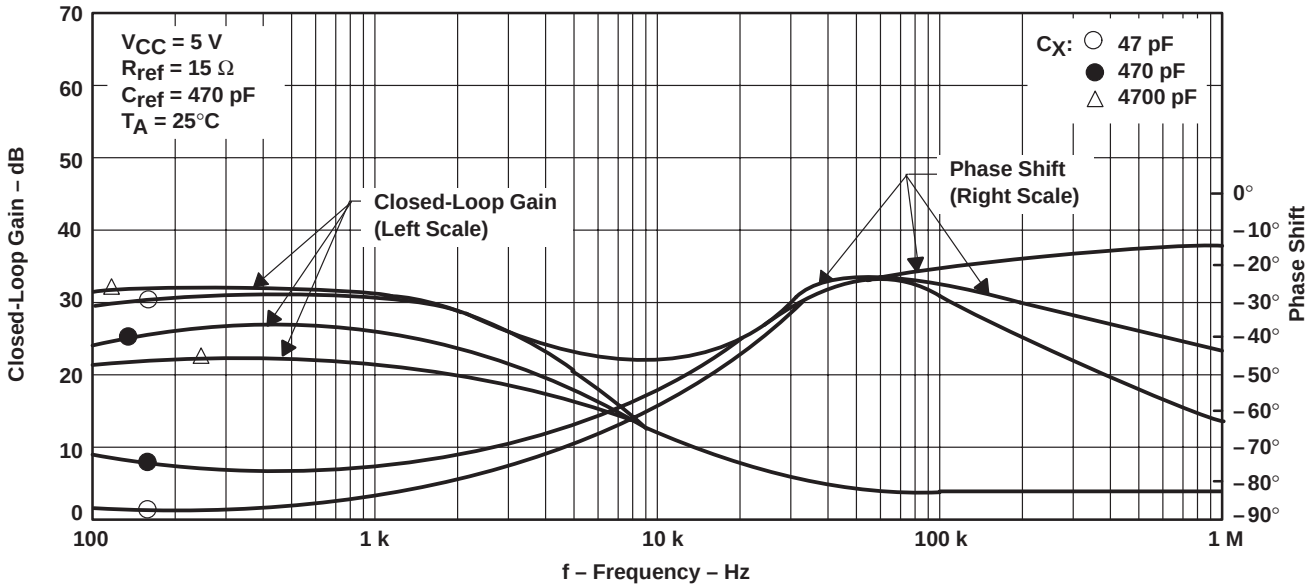


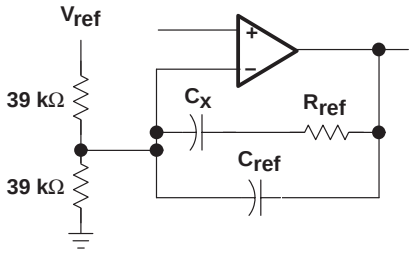
Test Circuit

Figure 19

TYPICAL CHARACTERISTICS

**CLOSED-LOOP GAIN AND PHASE SHIFT
vs
FREQUENCY**



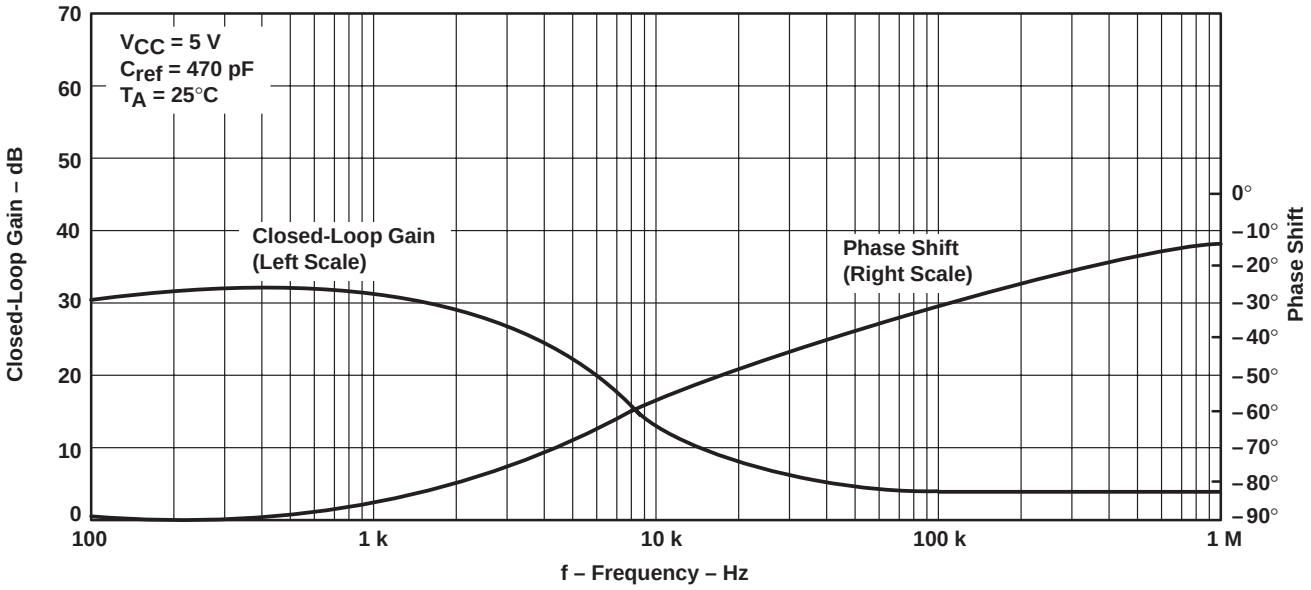


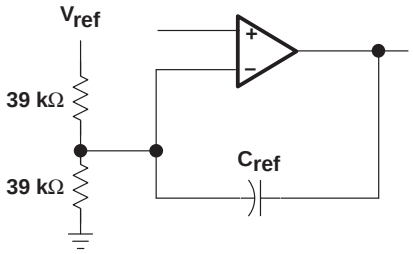
Test Circuit

Figure 20

TYPICAL CHARACTERISTICS

**CLOSED-LOOP GAIN AND PHASE SHIFT
vs
FREQUENCY**





Test Circuit

Figure 21

TYPICAL CHARACTERISTICS

**OUTPUT SINK CURRENT
vs
COLLECTOR OUTPUT SATURATION VOLTAGE**

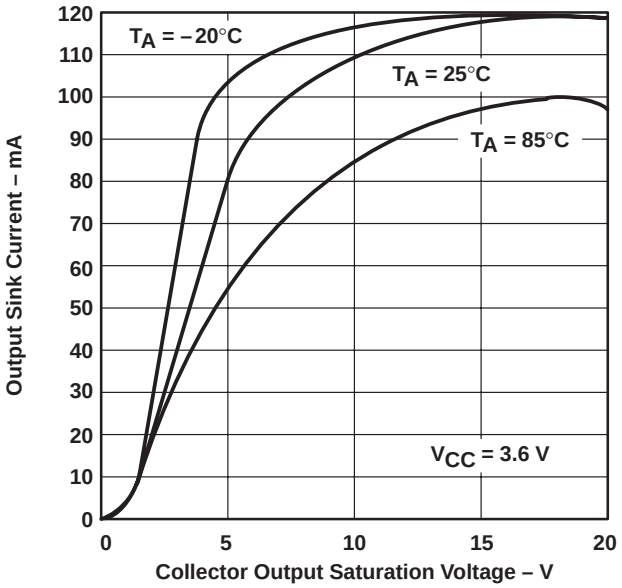
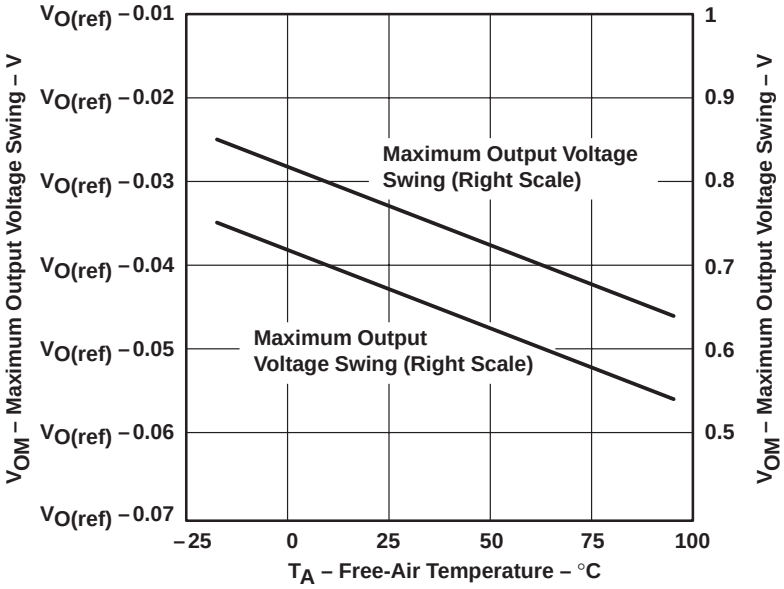
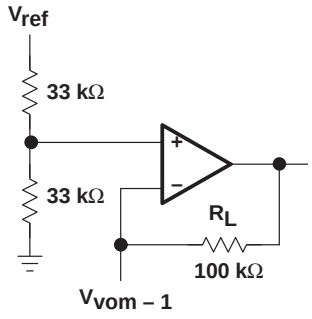


Figure 22

**MAXIMUM OUTPUT VOLTAGE SWING
vs
FREE-AIR TEMPERATURE**





V_{CC} = 3.6 V
R_L = 100 kΩ
V_{OM+1} = 1.25 V
$V_{OM\ -1}$ = 1.15 V (Right Scale)
$V_{OM\ -1}$ = 1.35 V (Left Scale)

TEST CIRCUIT

Figure 23

TYPICAL CHARACTERISTICS

OUTPUT TRANSISTOR ON DUTY CYCLE vs DEAD-TIME INPUT VOLTAGE

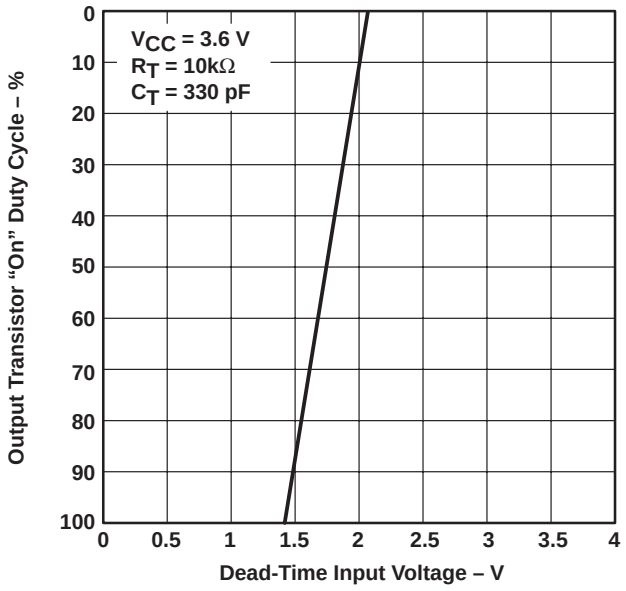


Figure 24

STANDBY CURRENT vs SUPPLY VOLTAGE

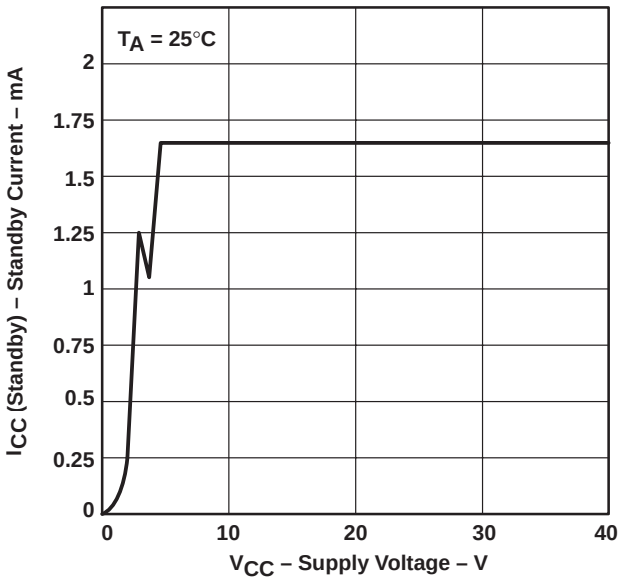


Figure 25

STANDBY CURRENT vs FREE-AIR TEMPERATURE

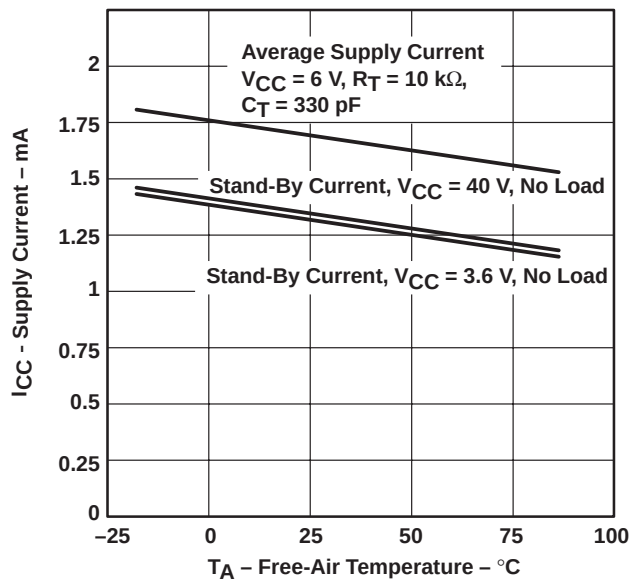


Figure 26

MAXIMUM CONTINUOUS POWER DISSIPATION vs FREE-AIR TEMPERATURE

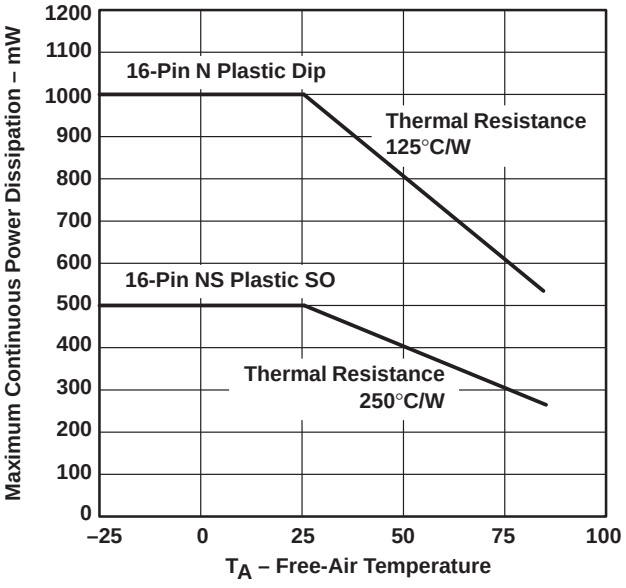
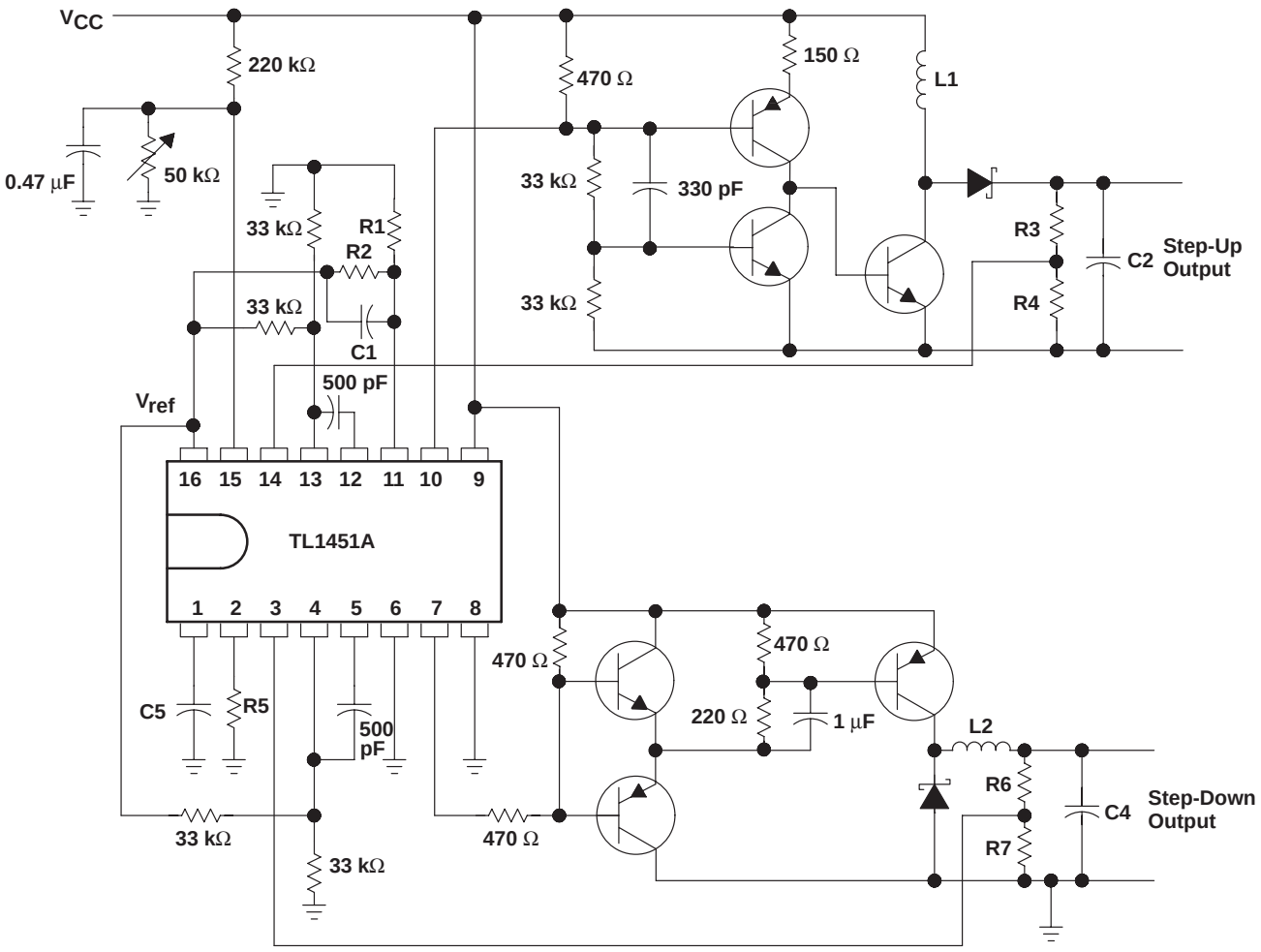


Figure 27

APPLICATION INFORMATION



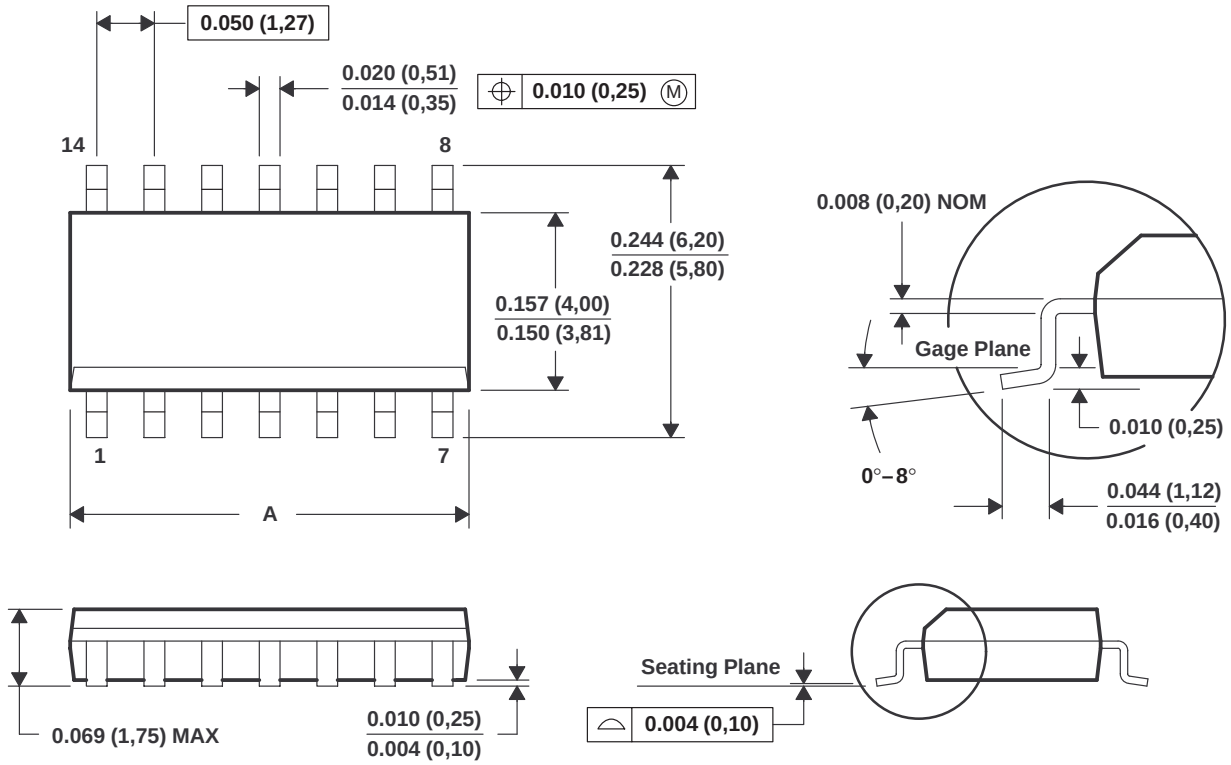
NOTE A: Values for R1 through R7, C1 through C4, and L1 and L2 depend upon individual application.

Figure 28. High-Speed Dual Switching Regulator

MECHANICAL DATA

D (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14 PINS SHOWN



DIM \ PINS **	8	14	16
A MAX	0.197 (5,00)	0.344 (8,75)	0.394 (10,00)
A MIN	0.189 (4,80)	0.337 (8,55)	0.386 (9,80)

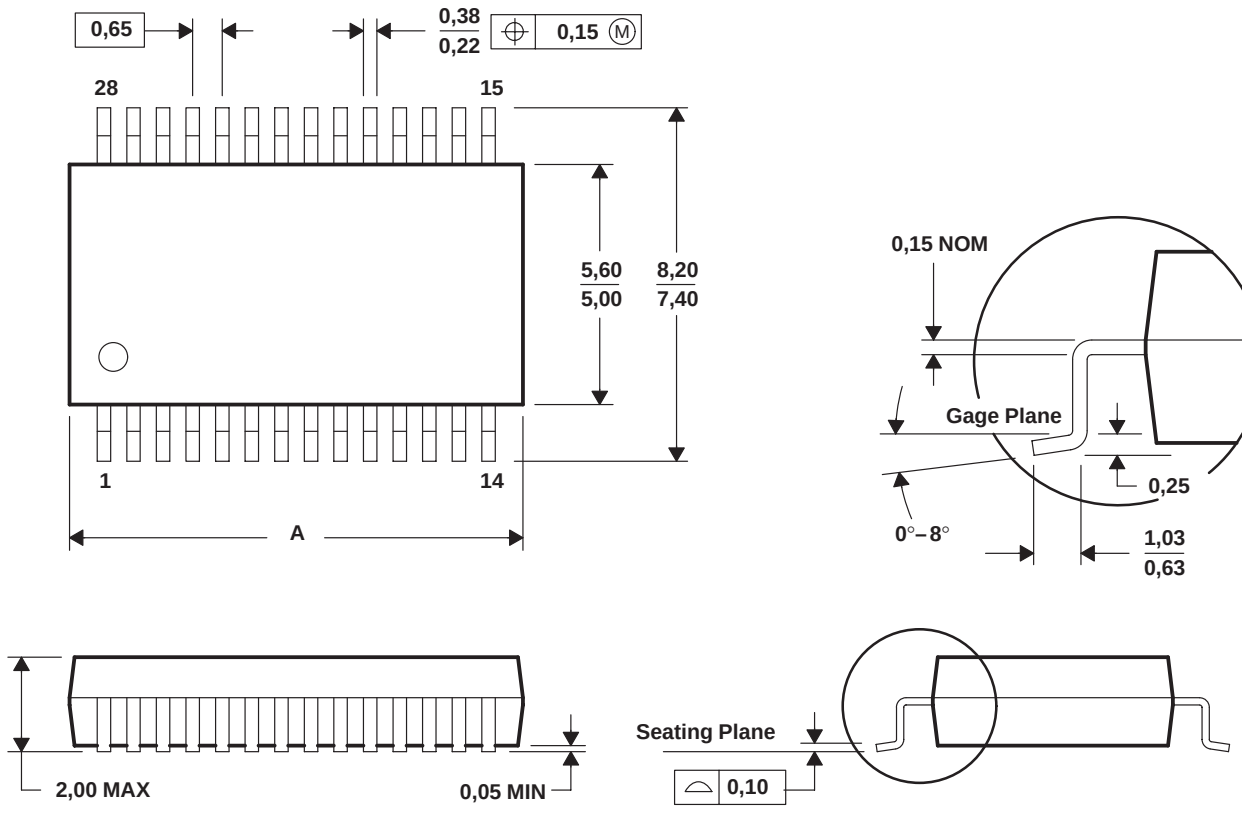
4040047/D 10/96

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).
D. Falls within JEDEC MS-012

MECHANICAL DATA

DB (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

28 PINS SHOWN



DIM \ PINS **	8	14	16	20	24	28	30	38
A MAX	3,30	6,50	6,50	7,50	8,50	10,50	10,50	12,90
A MIN	2,70	5,90	5,90	6,90	7,90	9,90	9,90	12,30

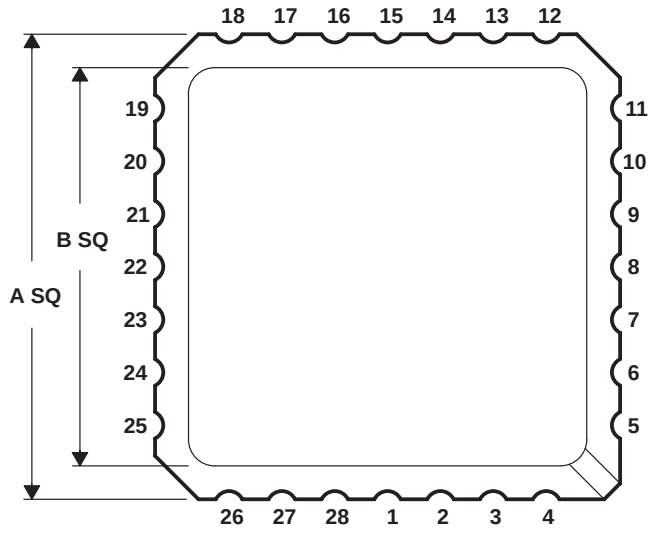
4040065 / C 10/95

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. Falls within JEDEC MO-150

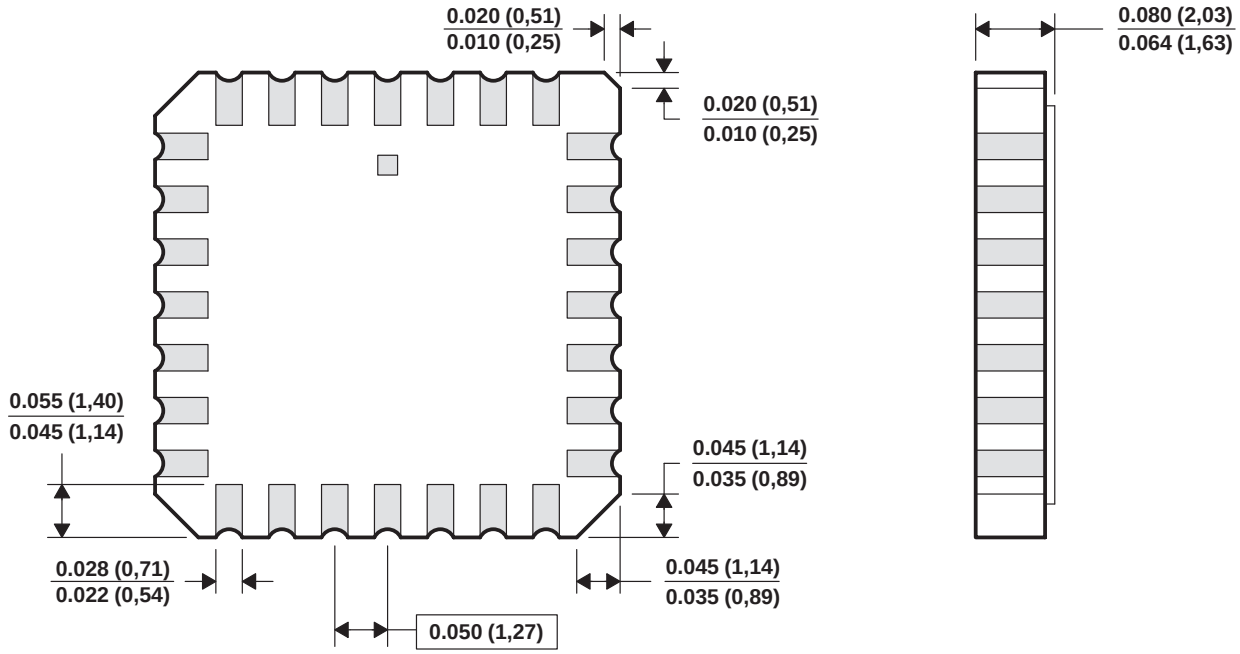
MECHANICAL DATA

FK (S-CQCC-N)** **LEADLESS CERAMIC CHIP CARRIER**

28 TERMINALS SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



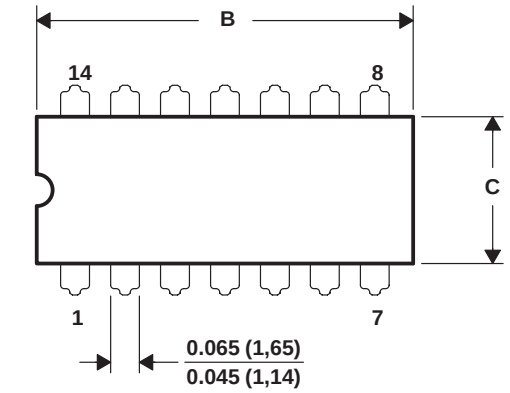
4040140/C 11/95

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a metal lid.
D. The terminals are gold-plated.
E. Falls within JEDEC MS-004

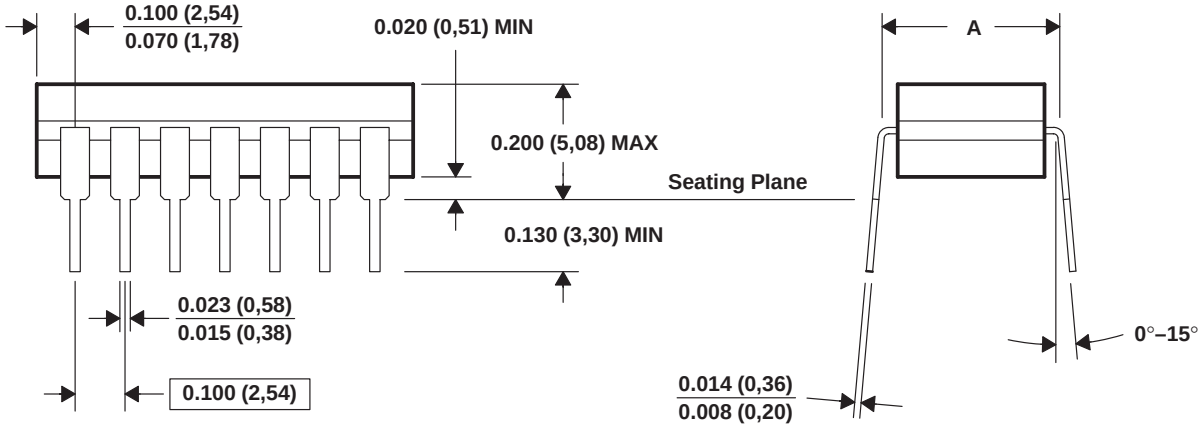
MECHANICAL DATA

J (R-GDIP-T)** **CERAMIC DUAL-IN-LINE**

14 LEADS SHOWN



DIM \ PINS **	14	16	20
A MAX	0.310 (7,87)	0.310 (7,87)	0.310 (7,87)
A MIN	0.290 (7,37)	0.290 (7,37)	0.290 (7,37)
B MAX	0.785 (19,94)	0.785 (19,94)	0.975 (24,77)
B MIN	0.755 (19,18)	0.755 (19,18)	0.930 (23,62)
C MAX	0.300 (7,62)	0.300 (7,62)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.245 (6,22)



4040083/E 03/99

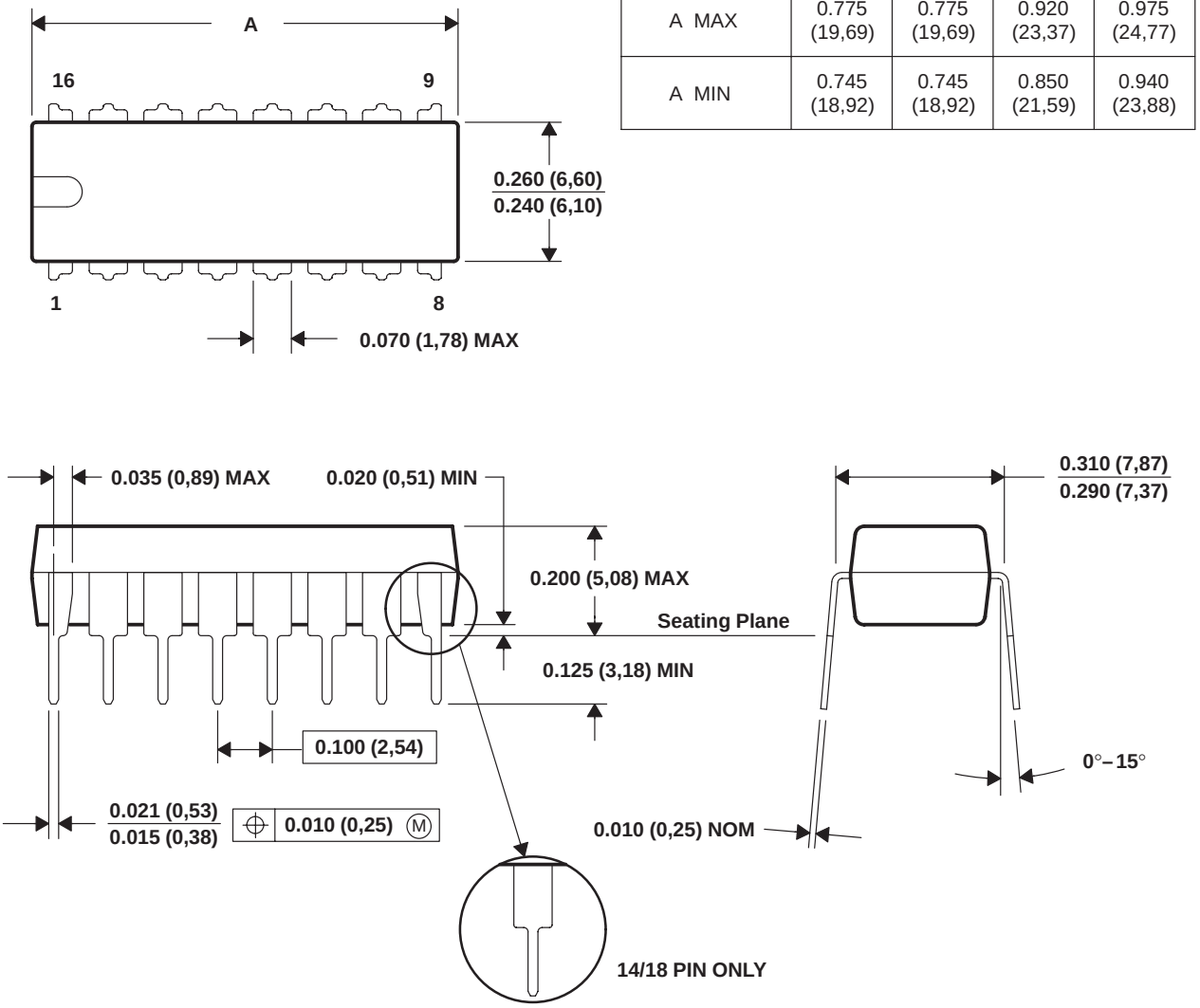
NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification.
E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, and GDIP1-T20

MECHANICAL DATA

N (R-PDIP-T)** **PLASTIC DUAL-IN-LINE PACKAGE**

16 PINS SHOWN

DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	0.975 (24,77)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)

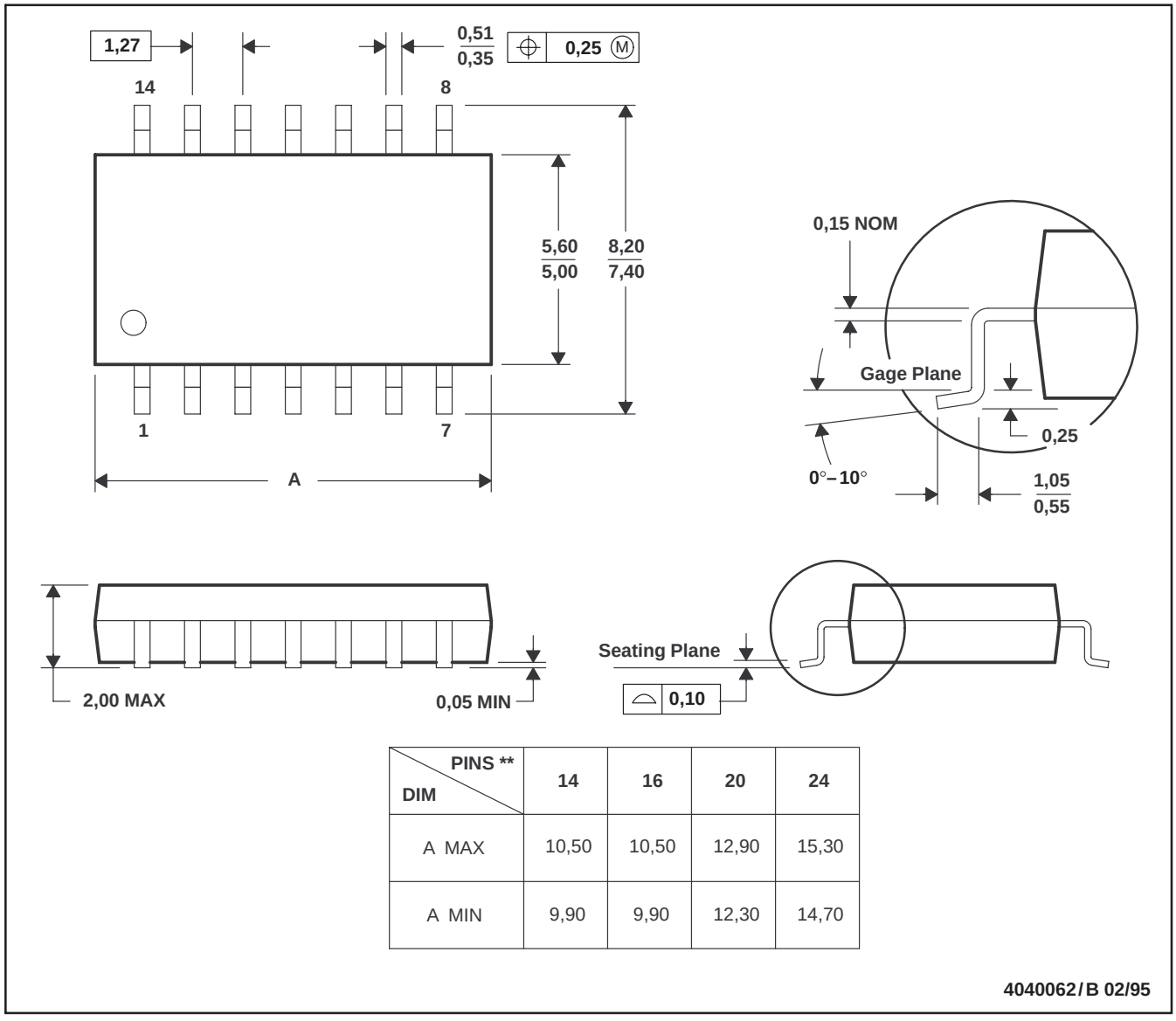


NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS-001 (20-pin package is shorter than MS-001).

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14 PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

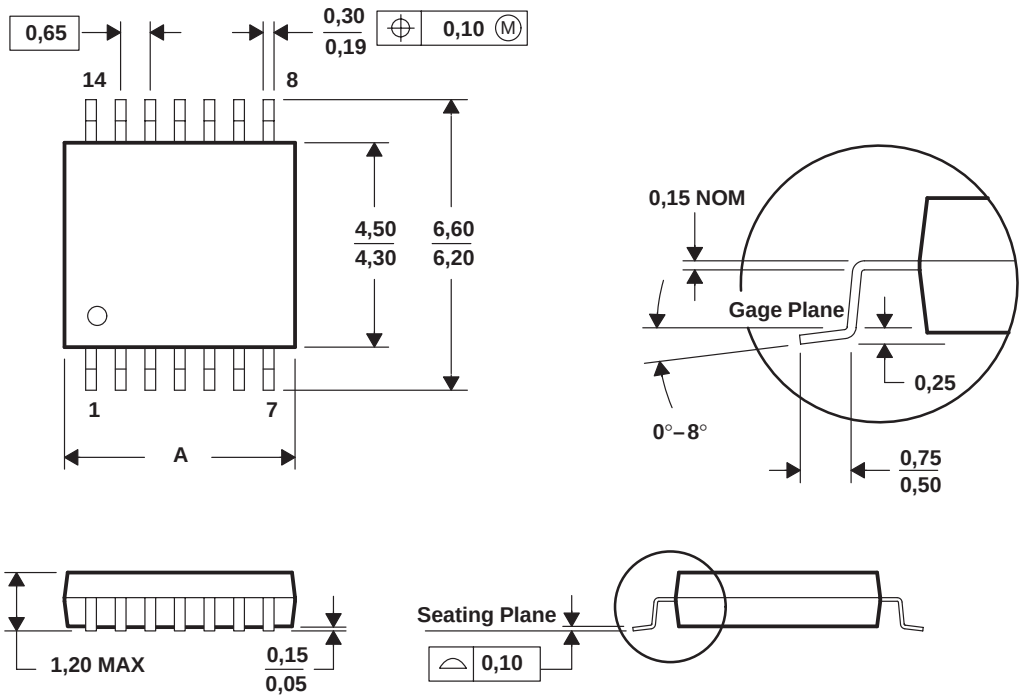
4040062/B 02/95

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

MECHANICAL DATA

PW (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14 PINS SHOWN



DIM \ PINS **	8	14	16	20	24	28
A MAX	3,10	5,10	5,10	6,60	7,90	9,80
A MIN	2,90	4,90	4,90	6,40	7,70	9,60

4040064/F 01/97

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. Falls within JEDEC MO-153

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TL1451A, DUAL PULSE-WIDTH-MODULATION CONTROL CIRCUIT

Device Status: Active

> Description
> Features
> Datasheets
> Pricing/Samples/Availability
> Application Notes
> Development Tools
> Applications

Parameter Name	TL1451A
Shutdown	No
Pulse - by - Pulse Isense	No
Vsupply Operating Range (V)	3.6-50
Output Type	Single Switch
Output Current (mA)	20
Frequency (max) (kHz)	500
Operating / Standby Current (mA)	1.7/1.3
Reference Voltage (V)	2.5
Vref tol (%)	4
Duty Cycle (max) (%)	100
Undervoltage Lockout	Yes
On-board Amplifiers	2
Output Mode Fixed Push - Pull	No
Output Mode Single - Ended	Yes
Programmable Outputs	No
Dead Time Control	Yes

Description

The TL1451A incorporates on a single monolithic chip all the functions required in the construction of two pulse-width-modulation (PWM) control circuits. Designed primarily for power-supply control, the TL1451A contains an on-chip 2.5-V regulator, two error amplifiers, an adjustable oscillator, two dead-time comparators, undervoltage lockout circuitry, and dual common-emitter output transistor circuits.

The uncommitted output transistors provide common-emitter output capability for each controller. The internal amplifiers exhibit a common-mode voltage range from 1.04 V to 1.45 V. The dead-time control (DTC) comparator has no offset unless externally altered and can provide 0% to 100% dead time. The on-chip oscillator can be operated by terminating RT and CT. During low V_{CC} conditions, the undervoltage lockout control circuit feature locks the outputs off until the internal circuitry is operational.

The TL1451AC is characterized for operation from -20°C to 85°C. The TL1451AQ is characterized for operation from -40°C to 125°C. The TL1451AM is characterized for operation from -55°C to 125°C.

Features

- Complete PWM Power Control Circuitry
- Completely Synchronized Operation
- Internal Undervoltage Lockout Protection
- Wide Supply Voltage Range
- Internal Short-Circuit Protection
- Oscillator Frequency...500 kHz Max
- Variable Dead Time Provides Control Over Total Range
- Internal Regulator Provides a Stable 2.5-V Reference Supply
- Available in Q-Temp Automotive
  HighRel Automotive Applications
  Configuration Control / Print Support
  Qualification to Automotive Standards

To view the following documents, Acrobat Reader 3.x is required.
To download a document to your hard drive, right-click on the link and choose 'Save'.

Datasheets

Full datasheet in Acrobat PDF: slvs024e.pdf (425 KB)
Full datasheet in Zipped PostScript: slvs024e.psz (387 KB)

Pricing/Samples/Availability

Orderable Device	Package	Pins	Temp (°C)	Status	Price/unit USD (100-999)	Pack Qty	DSCC Number	Availability / Samples
5962-9958401Q2A	FK	20	-55 TO 125	ACTIVE	7.00	1		Check stock or order
5962-9958401QEA	J	16	-55 TO 125	ACTIVE	5.59	1		Check stock or order
TL1451ACDBLE	DB	16		OBSOLETE				
TL1451ACDBR	DB	16		ACTIVE	0.97	2000		Check stock or order
TL1451ACN	N	16		ACTIVE	1.12	25		Check stock or order
TL1451ACNSLE	NS	16		ACTIVE	1.12	2000		Check stock or order
TL1451ACNSR	NS	16		ACTIVE	0.97	2000		Check stock or order
TL1451ACPWLE	PW	16		OBSOLETE				

TL1451ACPWR	PW	16		ACTIVE	0.97	2000		Check stock or order
TL1451AMFKB	FK	20	-55 TO 125	ACTIVE	7.00	1	5962-9958401Q2A	Check stock or order
TL1451AMJ		16	-55 TO 125	ACTIVE	4.75	1		Check stock or order
TL1451AMJB	J	16	-55 TO 125	ACTIVE	5.59	1	5962-9958401QEA	Check stock or order
TL1451AQD		16	-40 TO 125	ACTIVE	0.83	40		Check stock or order
TL1451AQDR		16	-40 TO 125	ACTIVE	0.81	2500		Check stock or order

Application Reports

- ANALOG APPLICATIONS JOURNAL, FEBRUARY 2000 (SLYT012A)
- ANALOG APPLICATIONS JOURNAL, NOVEMBER 1999 (SLYT010A)
- ELECTROSTATIC DISCHARGE APPLICATION NOTE (SSYA008)
- THERMAL CHARACTERISTICS OF LINEAR AND LOGIC PACKAGES USING JEDEC PCB DESIGNS (SZZA017A)
- UNDERSTANDING BOOST POWER STAGES IN SWITCHMODE POWER SUPPLIES (SLVA061)
- UNDERSTANDING BUCK POWER STAGES IN SWITCHMODE POWER SUPPLIES (SLVA057)
- UNDERSTANDING BUCK-BOOST POWER STAGES IN SWITCHMODE POWER SUPPLIES (SLVA059)

Table Data Updated on: 5/24/2000