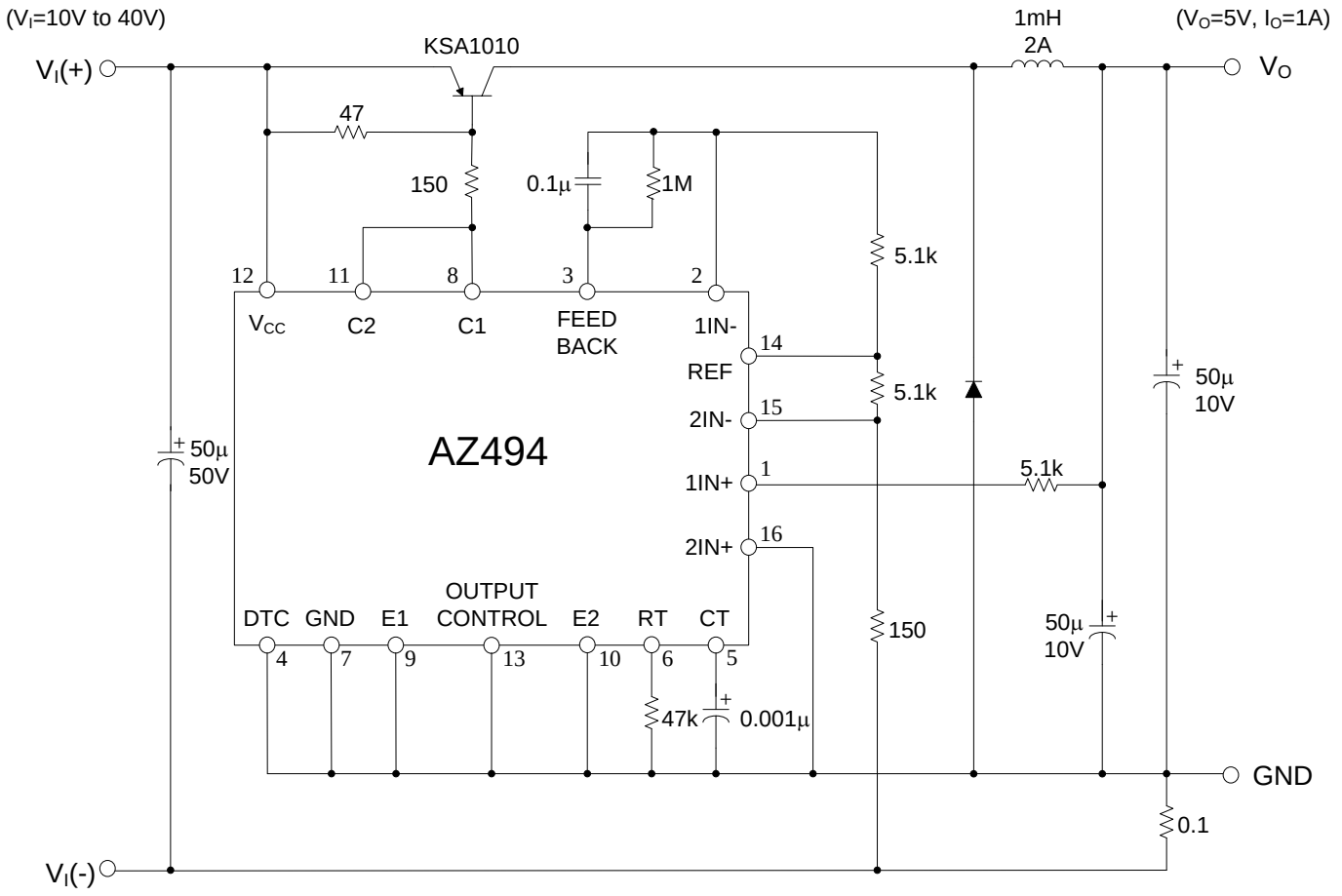
NEW PRODUCT

Output Function Control Table

Signal for Output Control	Output Function
V_I = GND	Single-ended or parallel output
V_I = V_{REF}	Normal push-pull operation

Typical Applications Circuit



Pulse Width Modulated Step-Down Converter

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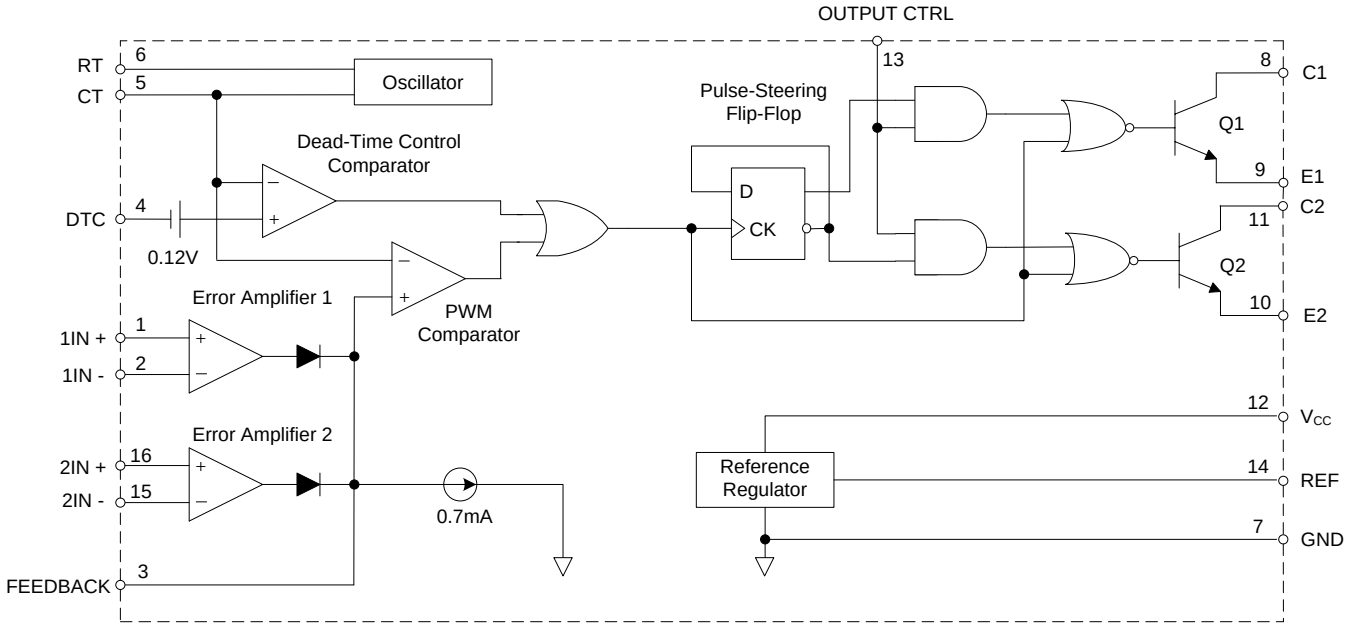
Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating		Unit
V_{CC}	Supply Voltage (Note 5)	40		V
V_I	Amplifier Input Voltage	-0.3 to V_{CC} + 0.3		V
V_O	Collector Output Voltage	40		V
I_O	Collector Output Current	250		mA
θ_{JA}	Package Thermal Impedance (Note 6)	M Package	73	°C/W
		P Package	67	
–	Lead Temperature 1.6mm from case for 10 seconds	+260		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
–	ESD Rating (Machine Model)	200		V

Notes: 4. Stresses greater than 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 Ratings" for extended periods may affect device reliability.

5. All voltage values are with respect to the network ground terminal.

6. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of +150°C can affect reliability.

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Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	7	15	36	V
V_{C1}, V_{C2}	Collector Output Voltage	–	30	36	V
I_{C1}, I_{C2}	Collector Output Current(Each Transistor)	–	–	200	mA
V_I	Amplifier Input Voltage	0.3	–	V_{CC} - 2	V
I_{FB}	Current Into Feedback Terminal	–	–	0.3	mA
I_{REF}	Reference Output Current	–	–	10	mA
C_T	Timing Capacitor	0.00047	0.001	10	μF
R_T	Timing Resistor	1.8	30	500	kΩ
f_{osc}	Oscillator Frequency	1.0	40	200	kHz
–	PWM Input Voltage (Pin 3, 4, 14)	0.3	–	5.3	V
T_A	Operating Free-Air Temperature	-40	–	+85	°C

Electrical Characteristics (T_A=+25°C, V_{CC}=20V, f=10kHz, unless otherwise noted.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Reference Section						
V_{REF}	Output Reference Voltage for AZ494A	I_{REF}=1mA	4.90	4.95	5.0	V
		I_{REF}=1mA, T_A= -40 to +85°C	4.85	4.95	5.05	V
V_{REF}	Output Reference Voltage for AZ494C	I_{REF}=1mA	4.95	5.0	5.05	V
		I_{REF}=1mA, T_A= -40 to +85°C	4.9	5.0	5.1	V
R_{LINE}	Line Regulation	V_{CC} = 7V to 36V	–	2	25	mV
R_{LOAD}	Load Regulation	I_{REF}=1mA to 10mA	–	1	15	mV
I_{SC}	Short-Circuit Output Current	V_{REF} = 0V	10	35	50	mA
Oscillator Section						
f_{OSC}	Oscillator Frequency	C_T=0.001μF, R_T=30kΩ	–	40	–	kHz
		C_T=0.01μF, R_T=12kΩ	9.2	10	10.8	
		C_T=0.01μF, R_T=12kΩ T_A= -40 to +85°C	9.0	–	12	
$\Delta f / \Delta T$	Frequency Change with Temperature	C_T=0.01μF, R_T=12kΩ T_A= -40 to +85°C	–	–	1	%

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Electrical Characteristics (T_A=+25°C, V_{CC}=20V, f=10kHz unless otherwise noted.) (Cont.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dead-Time Control Section						
I_{BIAS}	Input Bias Current	V_{CC}=15V, V_{PIN4}= 0 to 5.25V	–	-2	-10	μA
D(MAX)	Maximum Duty Cycle	V_{CC}=15V, V_{PIN4}= 0V, V_{PIN13}= V_{REF}	45	–	–	%
V_{ITH}	Input Threshold Voltage	Zero Duty Cycle	–	3	3.3	V
		Maximum Duty Cycle	0	–	–	
Error-Amplifier Section						
V_{IO}	Input Offset Voltage	V_{PIN3} = 2.5V	–	2	10	mV
I_{IO}	Input Offset Current	V_{PIN3} = 2.5V	–	25	250	nA
I_{BIAS}	Input Bias Current	V_{PIN3} = 2.5V	–	0.2	1	μA
V_{CM}	Common-Mode Input Voltage Range	V_{CC}=7V to 36V	-0.3	–	V_{CC}-2	V
G_{VO}	Open-Loop Voltage Gain	V_O =0.5V to 3.5V	70	95	–	dB
BW	Unity-Gain Bandwidth	–	–	650	–	kHz
CMRR	Common-Mode Rejection Ratio	–	65	80	–	dB
I_{SINK}	Output Sink Current (Feedback)	V_{ID} = -15mV to -5V, V3 = 0.7V	-0.3	-0.7	–	mA
I_{SOURCE}	Output Source Current (Feedback)	V_{ID}=15mV to 5V, V3 = 3.5V	2	–	–	mA
PWM Comparator Section						
V_{ITH}	Input Threshold Voltage	Zero duty cycle	–	4	4.5	V
I_{SINK}	Input Sink Current	V3 = 0.7V	-0.3	-0.7	–	mA
Output Section						
V_{CE} (SAT)	Output Saturation Voltage (Common Emitter)	V_E = 0V, I_C =200mA	–	1.1	1.3	V
V_{CC} (SAT)	Output Saturation Voltage (Emitter Follower)	V_{CC} = 15V, I_E = -200mA	–	1.5	2.5	V
I_C (OFF)	Collector Off-State Current	V_{CE} = 36V, V_{CC}=36V	–	2	100	μA
I_E(OFF)	Emitter Off-State Current	V_{CC} = V_C = 36V, V_E = 0	–	–	-100	μA
Total Device						
I_{CC}	Supply Current	V_{PIN6} = V_{REF}, V_{CC}=15V	–	6	10	mA
Output Switching Characteristics						
t_R	Rise Time	Common Emitter Common Collector	–	100	200	ns
t_F	Fall Time	Common Emitter Common Collector	–	25	100	ns

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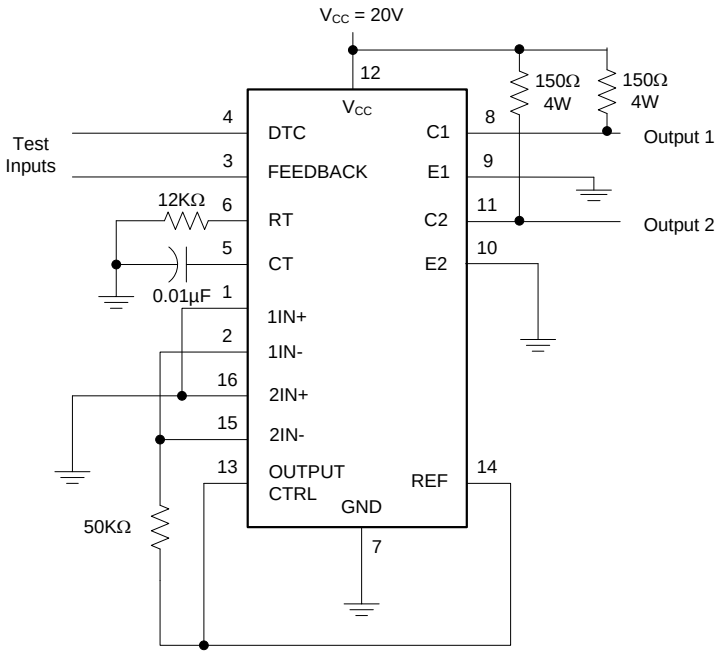
Parameter Measurement Information



Test Circuit

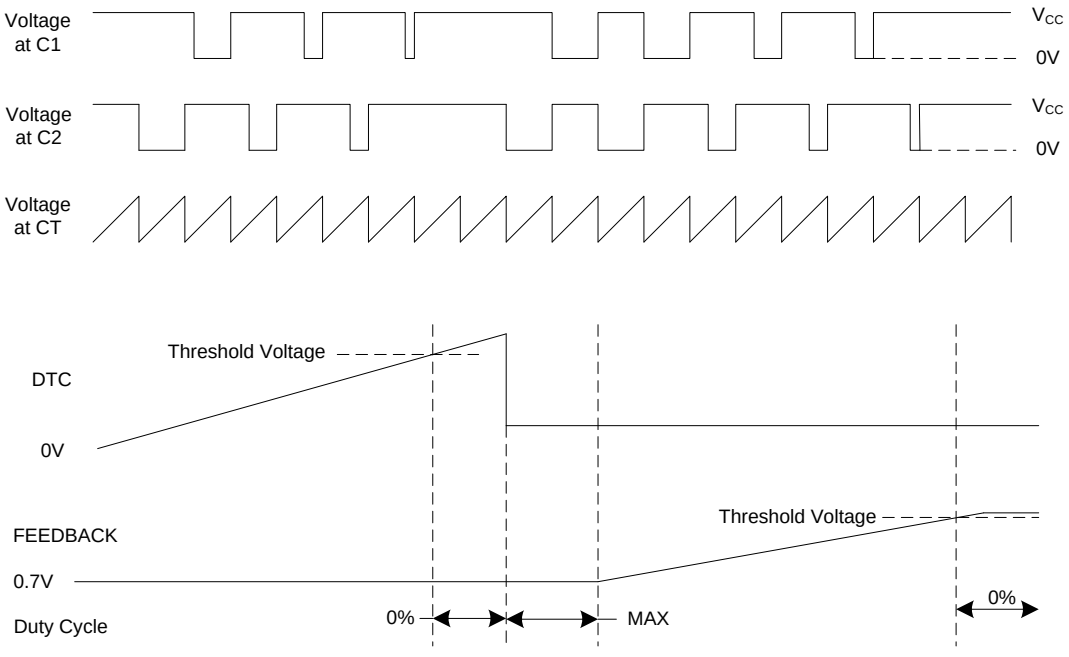


Figure 1. Operational Test Circuit and Waveforms

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Parameter Measurement Information (Cont.)

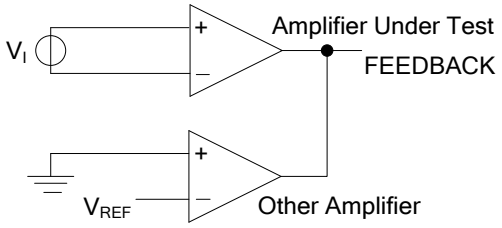
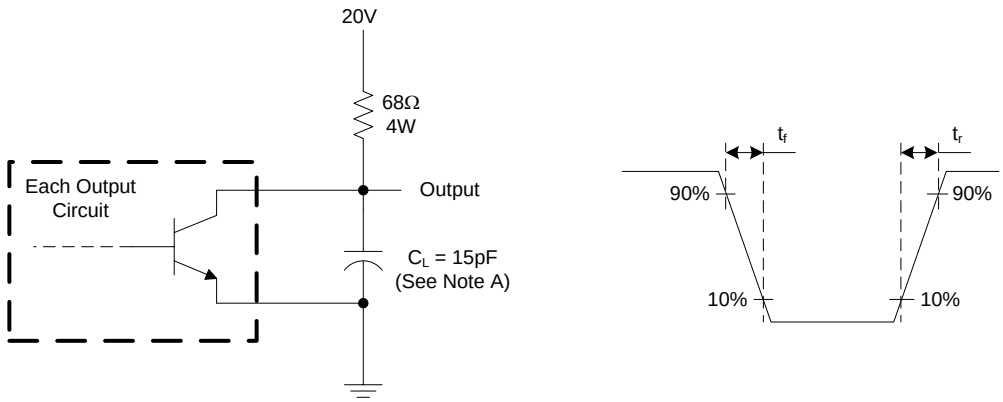
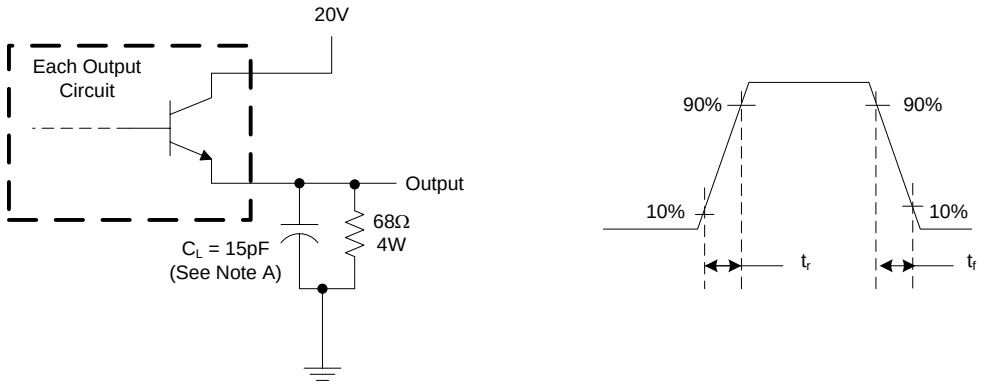


Figure 2. Error Amplifier Characteristics



Note A: C_L includes probe and jig capacitance.

Figure 3. Common-Emitter Configuration



Note A: C_L includes probe and jig capacitance.

Figure 4. Emitter-Follower Configuration

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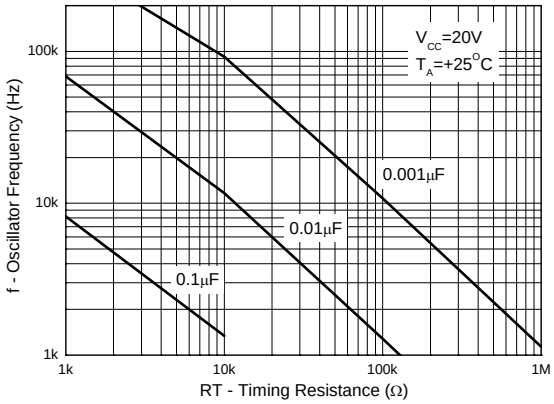
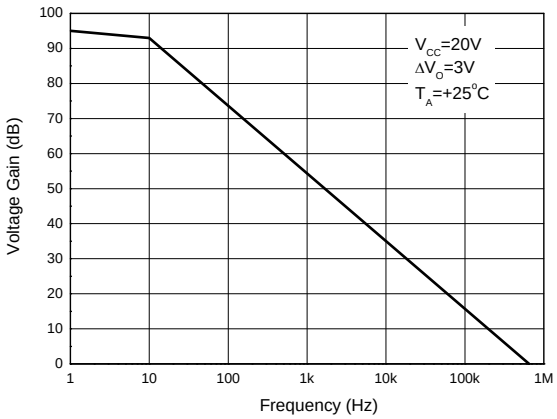
Performance Characteristics

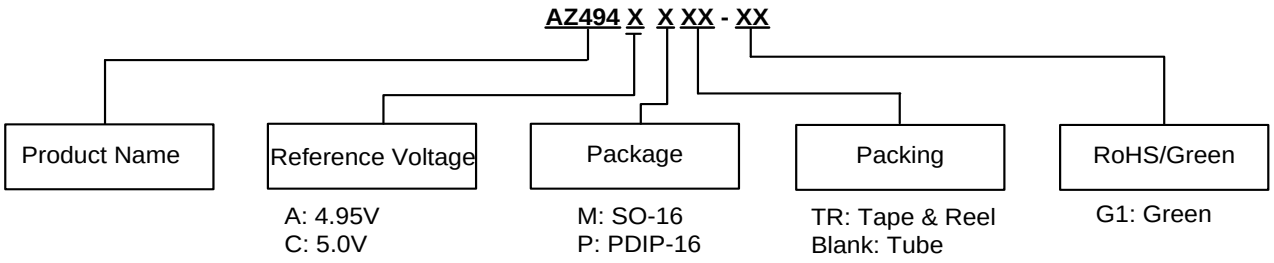
Oscillator Frequency vs. RT and CT



Error Amplifier Small-Signal Voltage Gain vs. Frequency



Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing
SO-16	-40 to +85°C	AZ494CMTR-G1	AZ494CM-G1	4000/Tape & Reel
PDIP-16		AZ494AP-G1	AZ494AP-G1	25/Tube

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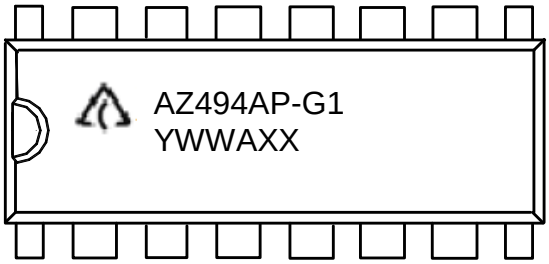
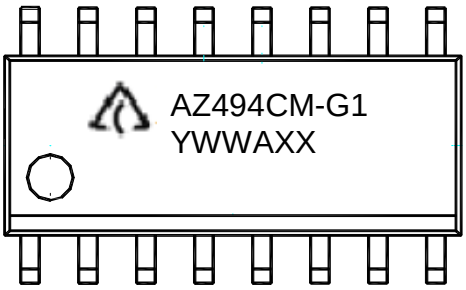
Marking Information

PDIP-16 (Top View)



First Line: Logo and Marking ID
(See Ordering Information)
Second Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch No.

SO-16 (Top View)



First Line: Logo and Marking ID
(See Ordering Information)
Second Line: Date Code
Y: Year
WW: Work Week of Molding
A: Assembly House Code
XX: 7th and 8th Digits of Batch No.

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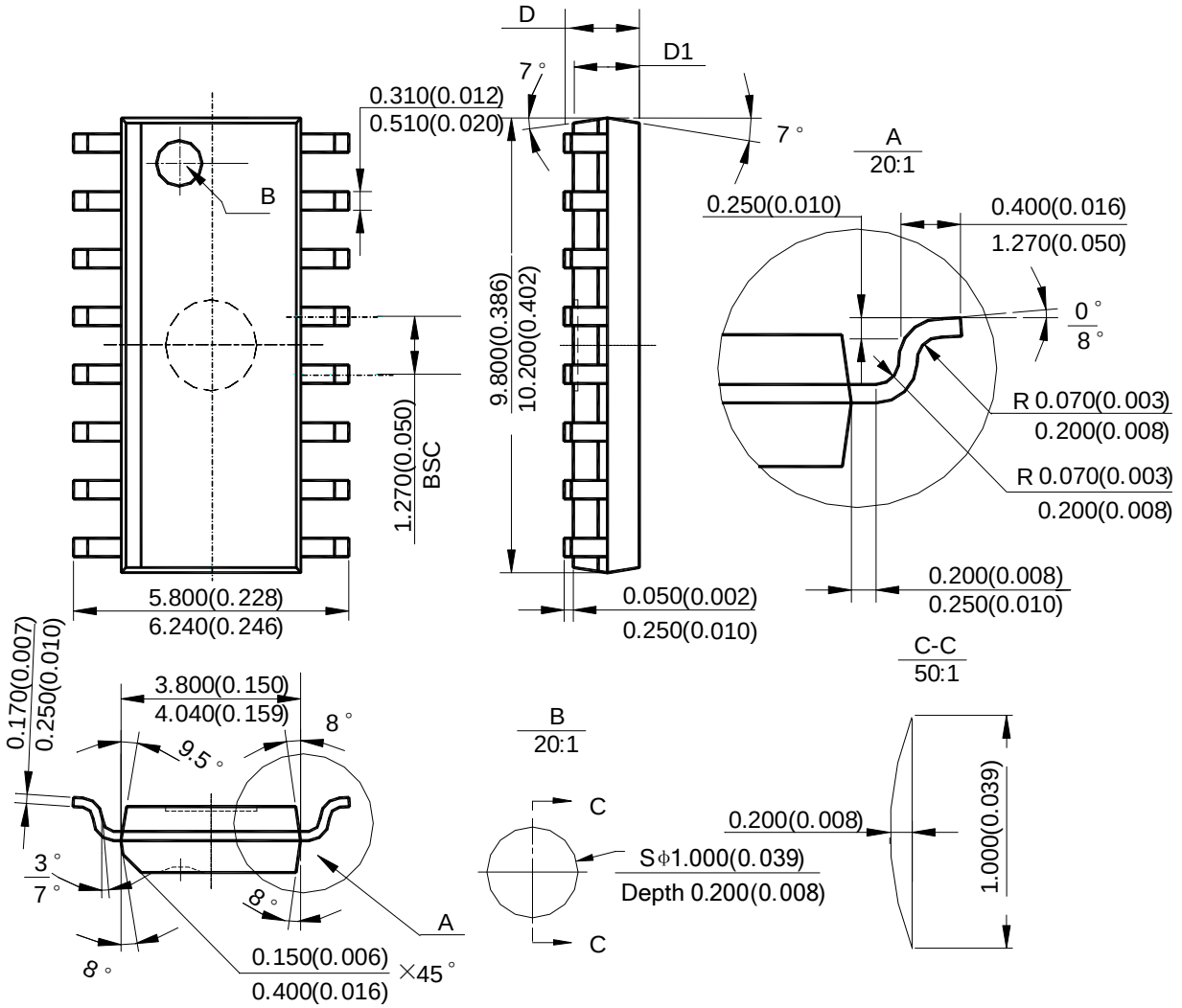
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SO-16



Note: Eject hole, oriented hole and mold mark is optional.

Symbol	D				D1			
	min(mm)	max(mm)	min(inch)	max(inch)	min(mm)	max(mm)	min(inch)	max(inch)
Option1	1.350	1.750	0.053	0.069	1.250	1.650	0.049	0.065
Option2	-	1.260	-	0.050	1.020	-	0.040	-

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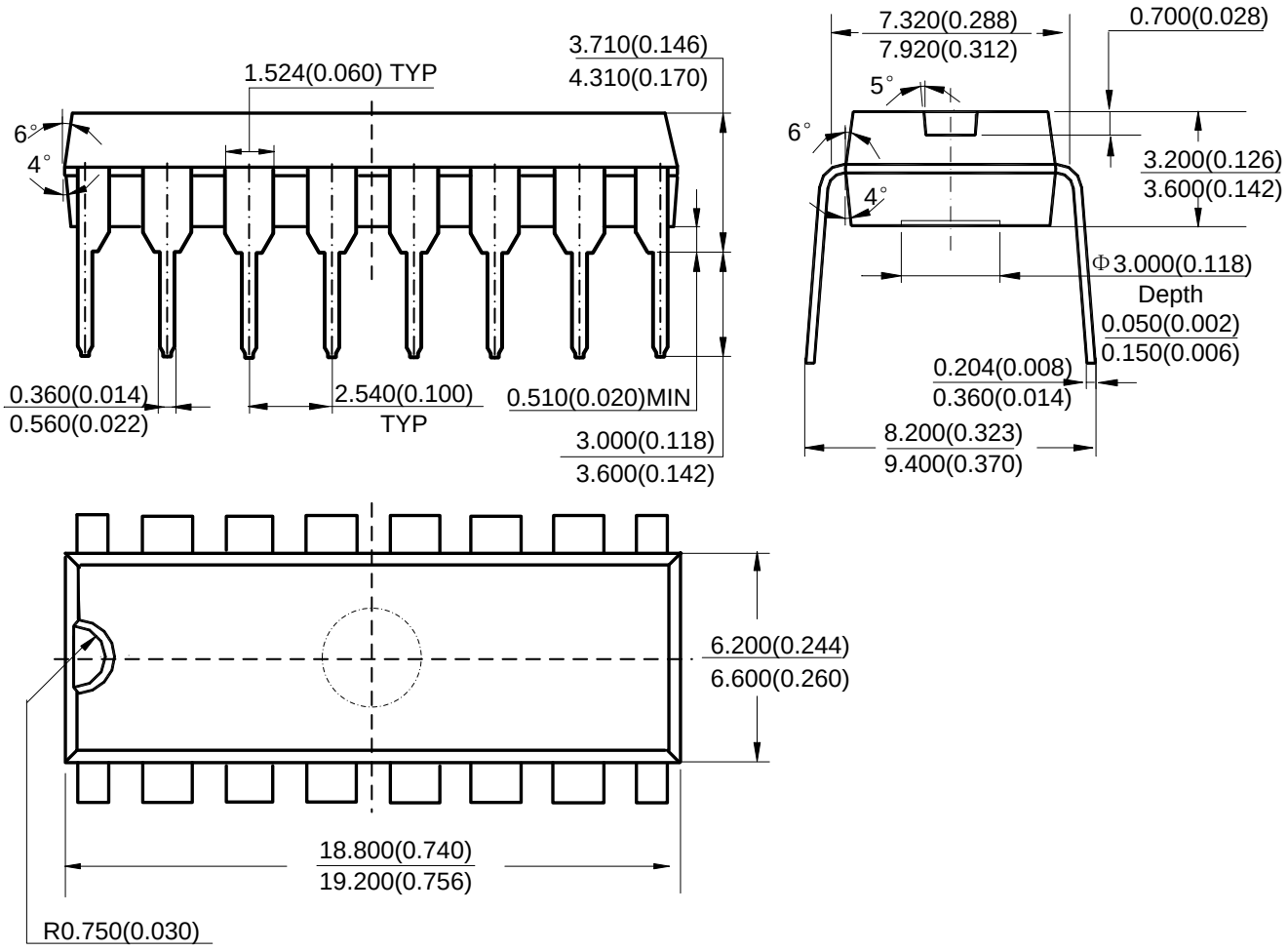
Package Outline Dimensions (All dimensions in mm(inch).) (Cont.)

(2) Package Type: PDIP-16

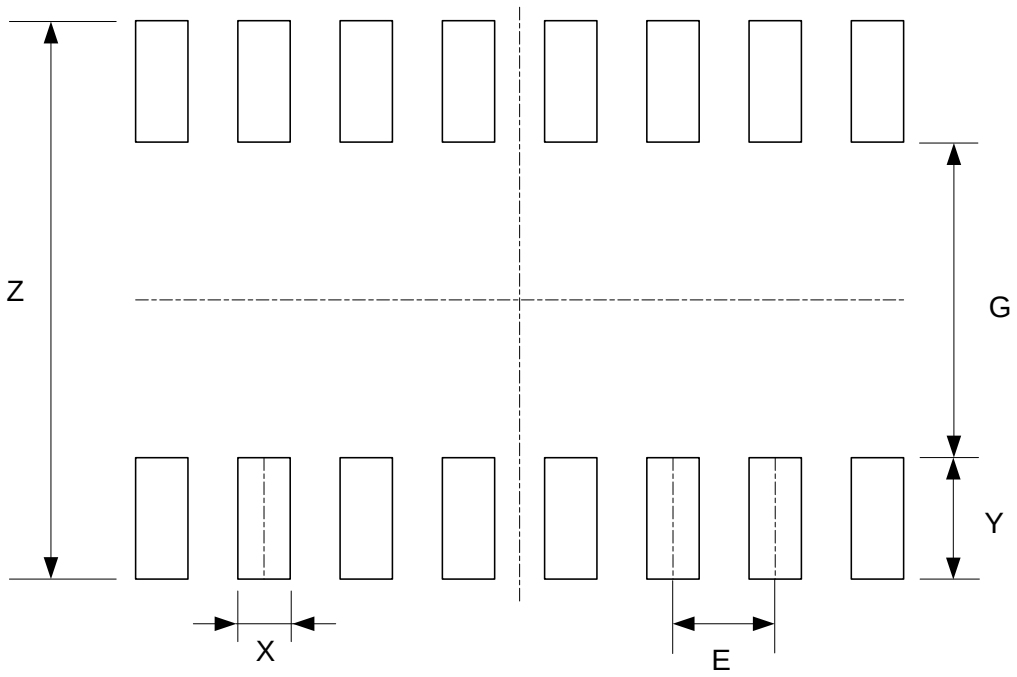


Note: Eject hole, oriented hole and mold mark is optional.

NEW PRODUCT

Suggested Pad Layout

(1) Package Type: SO-16



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050

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