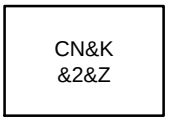
Low Voltage Comparator

FAN156



SIP6 1.45x1.0
CASE 127EB

MARKING DIAGRAM



CN = Specific Device Code
&K = 2−Digits Lot Run Traceability Code
&2 = 2−Digit Date Code
&Z = Assembly Plant Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

Description

The FAN156 is a low−power single comparator that typically consumes less than 10 μA of supply current. It is guaranteed to operate at a low voltage of 1.6 V and is fully operational up to 5.5 V, making it convenient for use in 1.8, 3.0 V, and 5.0 V systems.

The FAN156 has a complementary push−pull P− and N−channel output stage capable of driving a rail−to−rail output swing with a load ranging up to 5.0 mA.

Features

- Low Supply Current: I_{DD} 6 μA (Typical)
- Single Power Supply Operation
- Wide Common−Mode Input Voltage Range
- Push−Pull Output Circuit
- Low Input Bias Current
- Internal Hysteresis
- Packaged in MicroPak™ 6
- This is a Pb−Free Device

Applications

- Mobile Phones
- Alarm and Security Systems
- Personal Digital Assistants

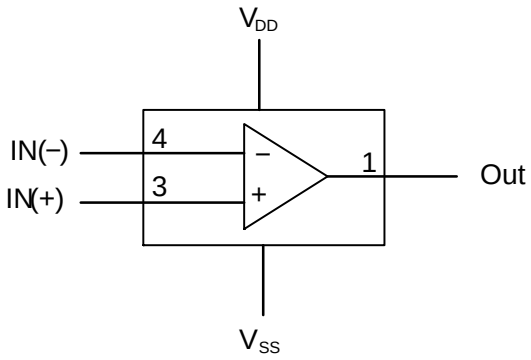


Figure 1. Functional Diagram

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PIN CONFIGURATION

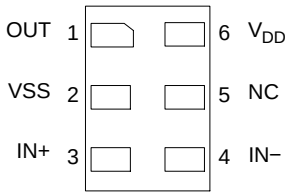

Figure 2. Pin Configuration (Top−Through View)

PIN DEFINITIONS

Pin #	Name	Description
1	OUT	Comparator Output
2	V_{SS}	Negative Supply Voltage
3	IN+	Non−Inverting Input
4	IN−	Inverting Input
5	NC	No Connect
6	V_{DD}	Positive Supply Voltage

FUNCTION TABLE

Inputs	Outputs
IN(−) > IN(+)	Output LOW
IN(+) > IN(−)	Output HIGH

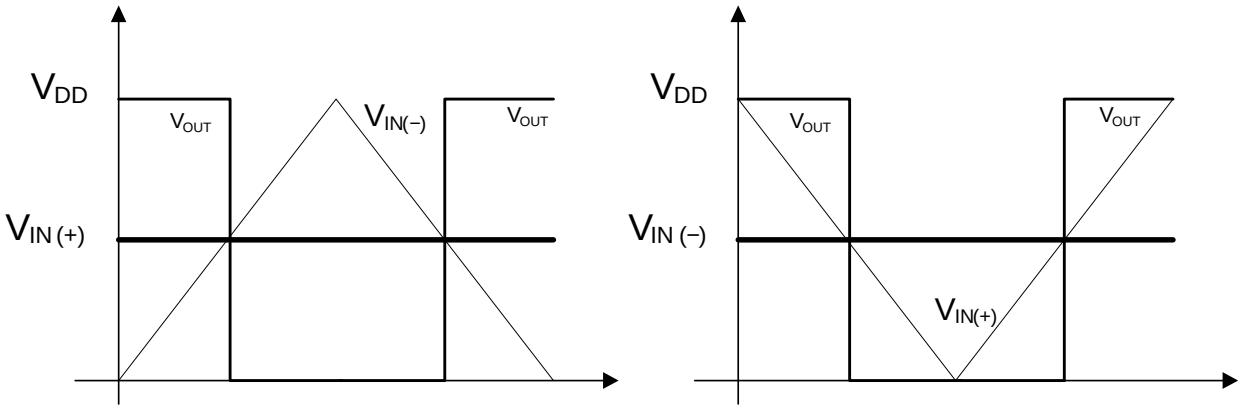

Figure 3. V_{IN} vs. V_{OUT}

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Condition	Min.	Max.	Unit
V_{DD} to V_{SS}	Supply Voltage		−3.0	+3.0	V
			0	6.0	
DV_{IN}	Differential Input Voltage			±6	
V_{IN}	Input Voltage			V_{SS} to V_{DD}	V
t_S	Output Short Circuit Duration (Note 1)			Indefinite	s
T_J	Junction Temperature			+150	°C
T_{STG}	Storage Temperature Range		−65	+150	°C
P_D	Power Dissipation			194	mW
Θ_{JA}	Thermal Resistance			335	°C/W
ESD	IEC 61000−4−2 System ESD	Air Gap		15	kV
		Contact		8	
	JEDEC JESD22−A114, Human Body Model	All Pins		8	
		Pin to Pin: IN(−), IN(+) to V_{DD} or VSS		12	
	JEDEC JESD22−C101, Charged Device Model	All Pins		2	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The maximum total power dissipation must not be exceeded.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Condition	Min.	Max.	Unit
V_{DD} to V_{SS}	Power Supply		−2.75	+2.75	V
			0	5.50	
V_{DD}	Power Supply	V_{SS} 0 V	1.6	5.5	V
V_{IN}	Input Voltage			V_{SS} to V_{DD}	V
I_{OH}/I_{OL}	Output Sink/Source Current	V_{DD} 5.0 V		5	mA
		V_{DD} 3.0 V		3	
		V_{DD} 1.6 V		1	
T_A	Operating Temperature, Free Air		−40	+85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{DD} = 5.5 V, V_{SS} = GND, and T_A = +25°C						
V_{HYS}	Input Hysteresis	V_{CM} = 0.5 V_{DD}		4		mV
V_{IO}	Input Offset Voltage (Note 2)	V_{CM} = 0.5 V_{DD}	−15	±1	+15	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio (Note 3)	V_{CM} = V_{DD}		68		dB
I_{DD}	Supply Current			6	17	μA
PSRR	Power Supply Rejection Ratio (Note 3)	ΔV_{DD} = 0.5 V	45	80		dB
I_{OS}	Output Short Circuit Current	V_O = V_{DD}		60		mA
		V_O = V_{SS}		90		
V_{OL}	Low−Level Output Voltage	I_{SINK} = 5.0 mA		0.1	0.3	V
V_{OH}	High−Level Output Voltage	I_{SOURCE} = 5.0 mA	5.2	5.4		V
t_{PLH}	Propagation Delay (Turn−On)	Overdrive 20 mV, C_L = 15 pF		0.40		μs
t_{PHL}	Propagation Delay (Turn−Off)	Overdrive = 20 mV, C_L = 15 pF		0.42		μs
t_{TLH}	Response Time, Output Rise/Fall (Note 4)	C_L = 50 pF		4.0		ns
t_{THL}				5.4		
V_{DD} = 3 V, V_{SS} = GND, and T_A = +25°C						
V_{HYS}	Input Hysteresis	V_{CM} = 0.5 V_{DD}		4		mV
V_{IO}	Input Offset Voltage (Note 2)	V_{CM} = 0.5 V_{DD}	−15	±1	+15	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio (Note 3)	V_{CM} = V_{DD}		60		dB
I_{DD}	Supply Current			5.5	15.0	μA
PSRR	Power Supply Rejection Ratio (Note 3)	ΔV_{DD} = 0.5 V	45	80		dB
I_{OS}	Output Short Circuit Current	V_O = V_{DD}		27		mA
		V_O = V_{SS}		35		
V_{OL}	Low−Level Output Voltage	I_{SINK} = 3.0 mA		0.15	0.35	V
V_{OH}	High−Level Output Voltage	I_{SOURCE} = 3.0 mA	2.65	2.85		V
t_{PLH}	Propagation Delay (Turn−On)	Overdrive = 20 mV, C_L = 15 pF		0.45		μs
t_{PHL}	Propagation Delay (Turn−Off)	Overdrive = 20 mV, C_L = 15 pF		0.47		μs
t_{TLH}	Response Time, Output Rise/Fall (Note 4)	C_L = 50 pF		6.1		ns
t_{THL}				6.2		
V_{DD} = 1.6 V, V_{SS} = GND, and T_A = +25°C						
V_{HYS}	Input Hysteresis	V_{CM} = 0.5 V_{DD}		3.5		mV
V_{IO}	Input Offset Voltage (Note 2)	V_{CM} = 0.5 V_{DD}	−15	±1	+15	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio (Note 3)	V_{CM} = V_{DD}		56		dB

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{DD} = 1.6 V, V_{SS} = GND, and T_A = +25°C						
I_{DD}	Supply Current			5	15	μA
PSRR	Power Supply Rejection Ratio (Note 3)	ΔV_{DD} = 0.5 V	45	80		dB
I_{OS}	Output Short Circuit Current	$V_O = V_{DD}$		5.5		mA
		$V_O = V_{SS}$		7.5		
V_{OL}	Low−Level Output Voltage	I_{SINK} = 5.0 mA		0.10	0.25	V
V_{OH}	High−Level Output Voltage	I_{SOURCE} = 5.0 mA	1.35	1.50		V
t_{PLH}	Propagation Delay (Turn−On)	Overdrive 20 mV, C_L = 15 pF		0.52		μs
t_{PHL}	Propagation Delay (Turn−Off)	Overdrive = 20 mV, C_L = 15 pF		0.54		μs
t_{TLH}	Response Time, Output Rise/Fall (Note 4)	C_L = 50 pF		16.5		ns
t_{THL}				13.0		

2. Differential input switching level is guaranteed at the minimum or maximum offset voltage, minus or plus half the maximum hysteresis voltage.
3. Guaranteed by design and characterization data.
4. Input signal: 1 kHz, square−wave signal with 10 ns edge rate.

TYPICAL PERFORMANCE CHARACTERISTICS

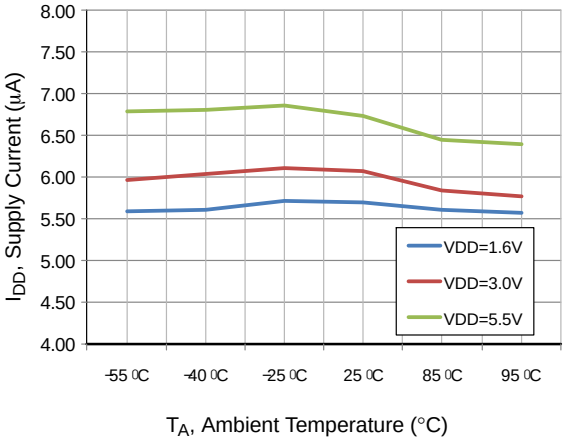

Figure 4. Supply Current vs. Temperature

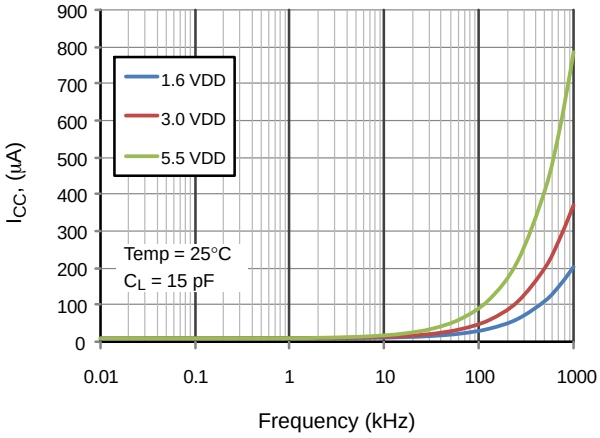

Figure 5. Supply Current vs. Output Transition Frequency

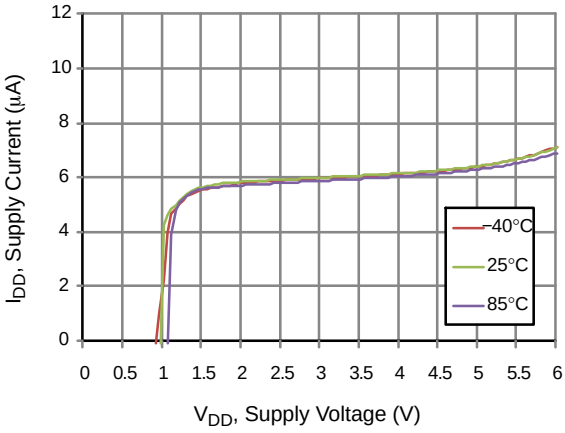

Figure 6. Supply Current vs. Supply Voltage

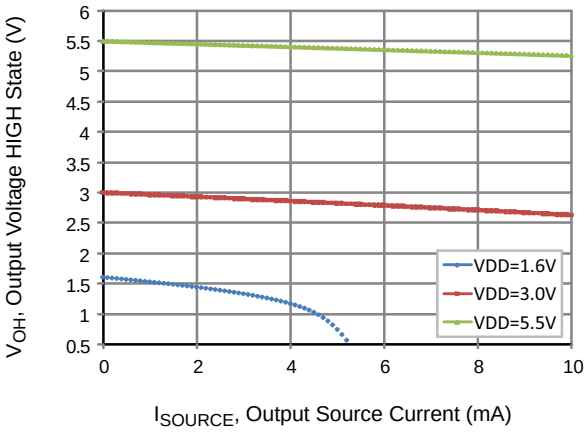

Figure 7. Output HIGH vs. Output Drive Current

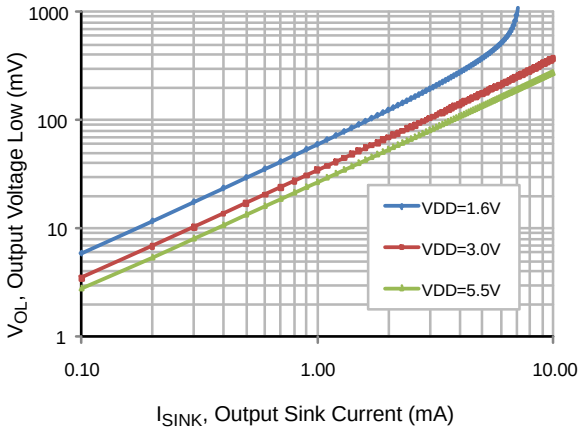

Figure 8. Output LOW vs. Output Drive Current

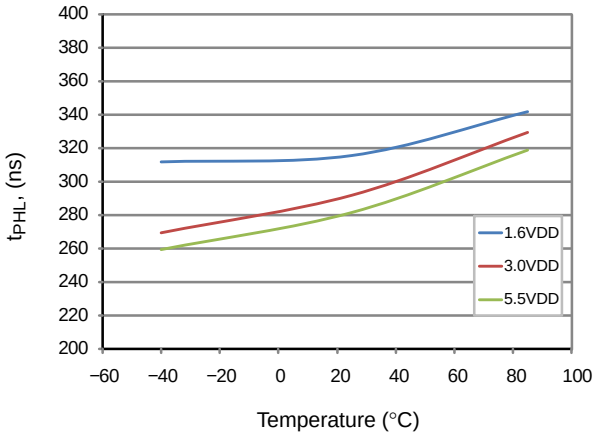

Figure 9. Propagation Delay $t_{(PHL)}$ vs. Temperature

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

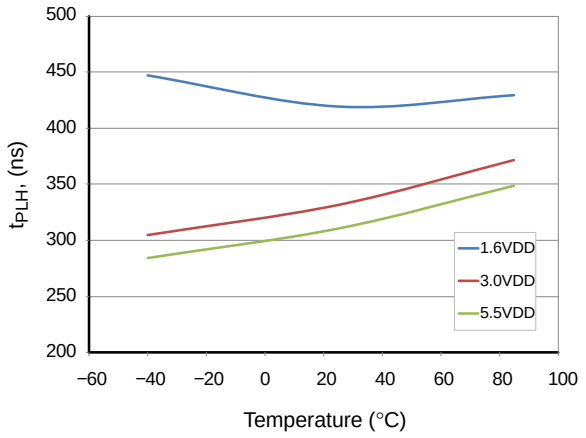

Figure 10. Propagation Delay $t_{(PLH)}$ vs. Temperature

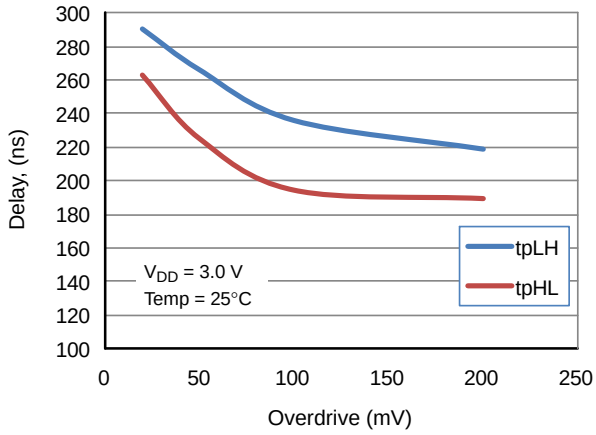

Figure 11. Propagation Delay vs. Input Overdrive

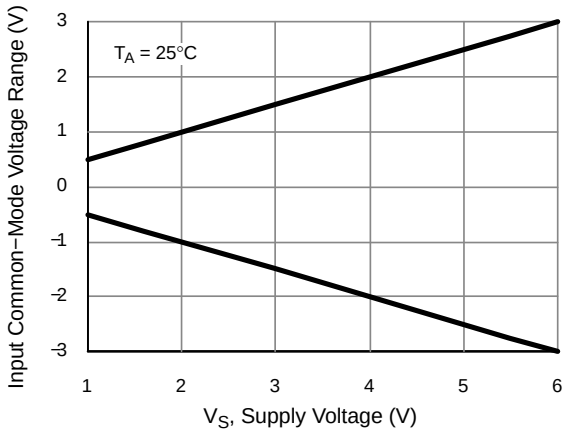

Figure 12. Input Common−Mode Voltage Range vs. Supply Voltage

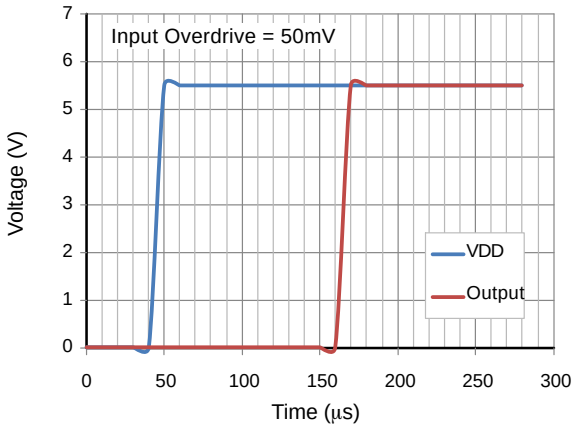

Figure 13. Power−Up Delay

ORDERING INFORMATION

Device	Operating Temperature Range	Top Mark	Package	Shipping†
FAN156L6X	−40°C to +85°C	CN	6−Lead, SIP6 1.45x1.0 (MicroPak™) (Pb−Free)	5000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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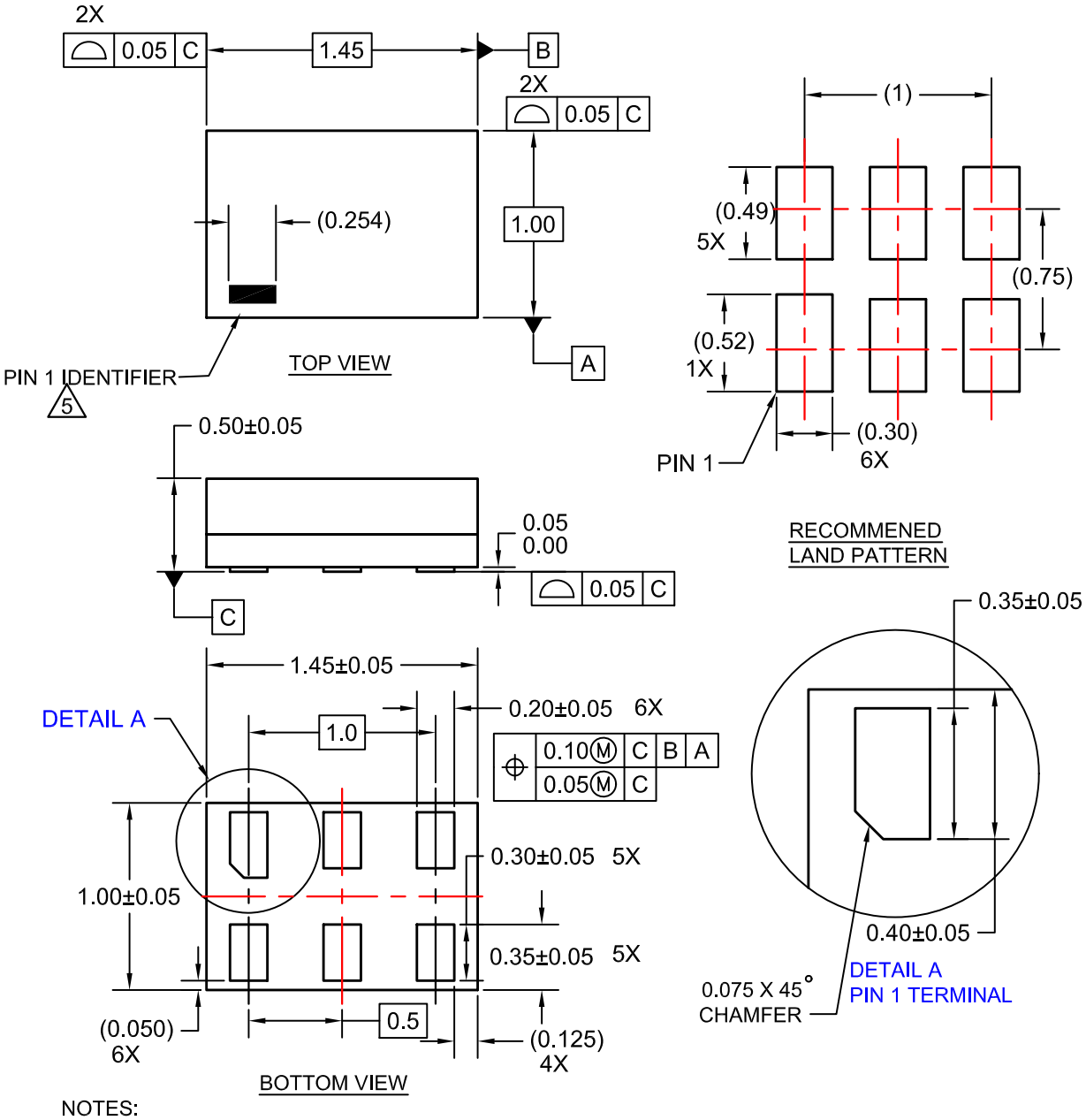
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

SIP6 1.45X1.0
CASE 127EB
ISSUE O

DATE 31 AUG 2016



NOTES:

1. CONFORMS TO JEDEC STANDARD MO-252 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-2009
4. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

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