Antenna Switch Control

MDC5101

The MDC5101 inputs TxE and RxE Logic Signals with an accessory input termination option and, allows positive and negative control voltages in accordance with the enclosed truth table. This device is primarily intended to control GaAs RF switches. It is also designed to interface with most HCMOS MCUs such as the ON Semiconductor MC68338.

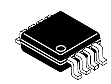
The MDC5101 is intended to replace a circuit of up to 18 discrete components and is available in a Micro–8 package. This device, in combination with a compatible RF switch, can be used to achieve duplex isolation in any Time Division Duplex Radio like GSM and DCS1800 with staggered Transmit Receive Time Slots. It can also be used to control an RF switch in dual band radio applications.

This integrated solution in a Micro–8 package compared with a discrete solution will add a great value in performance with less board space consumption.

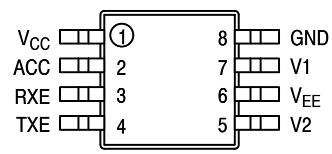
Features

- Miniature Micro–8 Surface Mount Package Saves Board Space
- Logic Level Control
- Designed to Interface with Microcontrollers

ANTENNA SWITCH CONTROLLER



PLASTIC PACKAGE
CASE 846A–02
(Micro–8)



(Top View)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Positive Power Supply Voltage (1)	V_{CC}	15	Vdc
Negative Power Supply Voltage (2)	V_{EE}	–12	Vdc
Differential Power Supply Voltage	$V_{CC}–V_{EE}$	15	Vdc
Input Voltage (3)	V_{in}	V_{CC}	Vdc
Output Current (4)	I_1, I_2	5.0	mAdc
Operating Temperature Range	T_A	–40 to +85	°C
Storage Temperature Range	T_{stg}	–55 to +150	°C
Junction Temperature	T_J	150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Total Power Dissipation Derate above 25°C	P_D	510 4.0	mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	245	°C/W

Note 1: Pin 1 Referenced to Ground
Note 2: Pin 6 Referenced to Ground
Note 3: Pin 3, 4 Referenced to Ground
Note 4: Pin 5, 7 Referenced to Ground

DEVICE MARKING

5101

ORDERING INFORMATION

MDC5101R2	13 inch Reel, 4000 units

ESD Rating

ESD protection on each pin to ±2500 V per MIL–STD6883 method 3015, using human body model of 100 pF, 1500 Ohms and using the machine model to ±200 V at 100 pF and 0 Ohms. Parts must meet electrical requirement after testing.

ELECTRICAL CHARACTERISTICS (V_{CC} = 2.75 V, V_{EE} = –5.0 V, T_A = T_{low} to T_{high} unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
DC PARAMETERS					
Positive Power Supply Current V1, V2, ACC 10 kΩ to GND, RxE = V_{IH}, TxE = V_{IL}	I_{CC}	—	—	1.0	mA
Negative Power Supply Current V1, V2, ACC Open, RxE = V_{IL}, TxE = V_{IH}	I_{EE}	—	–50	—	µA
Negative Power Supply Current V1, V2, ACC 10 kΩ to GND, RxE = V_{IL}, TxE = V_{IH}	I_{EE}	–1.5	—	—	mA
High Level Output Voltage					Vdc
$I_1 = I_2$ = 250 µA, ACC Open					
RxE = V_{IL}, TxE = V_{IH}	$V_{OH(V1)}$	V_{IH}–0.25			
RxE = V_{IH}, TxE = V_{IL}	$V_{OH(V2)}$	V_{IH}–0.25			
$I_1 = I_2$ = 250 µA, ACC 10 kΩ to GND					
RxE = V_{IL}, TxE = V_{IH}	$V_{OH(V2)}$	V_{IH}–0.25			
RxE = V_{IH}, TxE = V_{IL}	$V_{OH(V1)}$	V_{IH}–0.25			
Low Level Output Voltage					Vdc
$I_1 = I_2$ = 250 µA, ACC Open					
RxE = TxE = V_{IL}	$V_{OL(V1,V2)}$	–0.5	0	0.5	
RxE = V_{IH}, TxE = V_{IL}	$V_{OL(V1)}$	–0.5	0	0.5	
$I_1 = I_2$ = 250 µA, ACC 10 kΩ to GND					
RxE = TxE = V_{IL}	$V_{OL(V1,V2)}$	–0.5	0	0.5	
RxE = V_{IH}, TxE = V_{IL}	$V_{OL(V2)}$	–0.5	0	0.5	
Low Level Output Voltage					Vdc
$I_1 = I_2$ = 250 µA, TxE = V_{IH}, RxE = V_{IL}					
ACC Open	$V_{OL(V2)}$			–4.5	
ACC 10 kΩ to GND	$V_{OL(V1)}$			–4.5	
AC PARAMETERS					
Propagation Delay					µs
RxE, TxE to V1, V2 ACC Open	t_{PLH}	—	—	1.5	
	t_{PHL}	—	—	1.5	
RxE, TxE to V1, V2 ACC 10 kΩ to GND	t_{PLH}	—	—	1.5	
	t_{PHL}	—	—	1.5	
ACC to V1, V2	t_{PLH}	—	—	5.0	
	t_{PHL}	—	—	5.0	

TRUTH TABLE

Input Logic			Output Logic		
RxE	TxE	ACC	V2	V1	
0	0	0	0	0	
0	0	1	0	0	
0	1	0	–5.0	2.7	
0	1	1	2.7	–5.0	
1	0	0	2.7	0	
1	0	1	0	2.7	
1	1	0	2.7	2.7	State not allowed in software
1	1	1	2.7	2.7	State not allowed in software

Note: ACC Logic Low = Open, ACC Logic High = 10 kΩ

Characteristic	Symbol	Min	Typ	Max	Unit
Low Level Input Voltage RxE, TxE	V_{IL}	—	—	0.4	Vdc
High Level Input Voltage RxE, TxE	V_{IH}	2.5	—	—	
Maximum Voltage Differential	V_{CC}–V_{IH}	—	—	1.5	

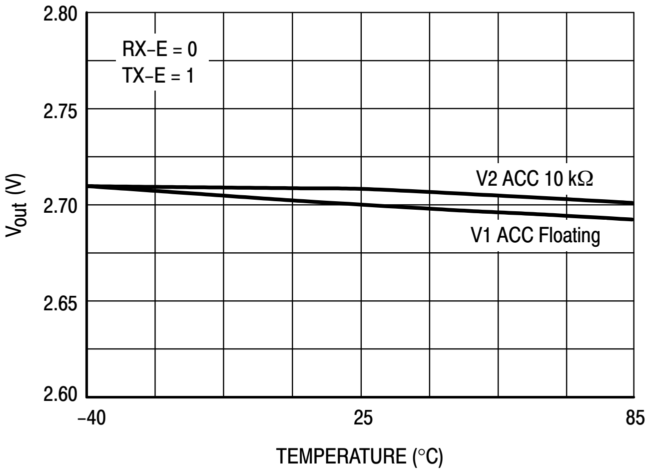


Figure 1. $V_{out\ (high)}$ versus Temperature

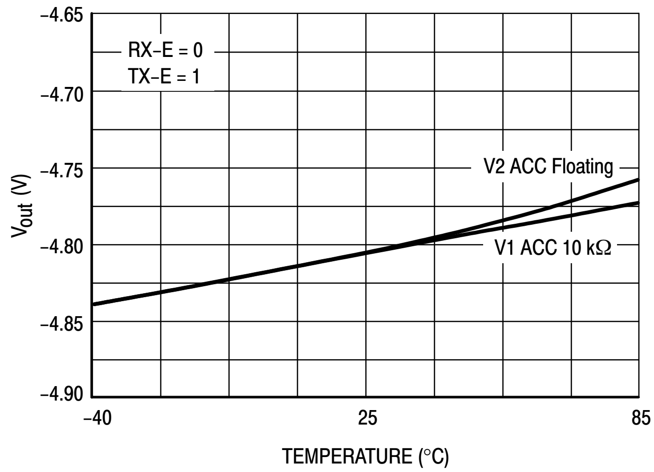


Figure 2. $V_{out\ (low)}$ versus Temperature

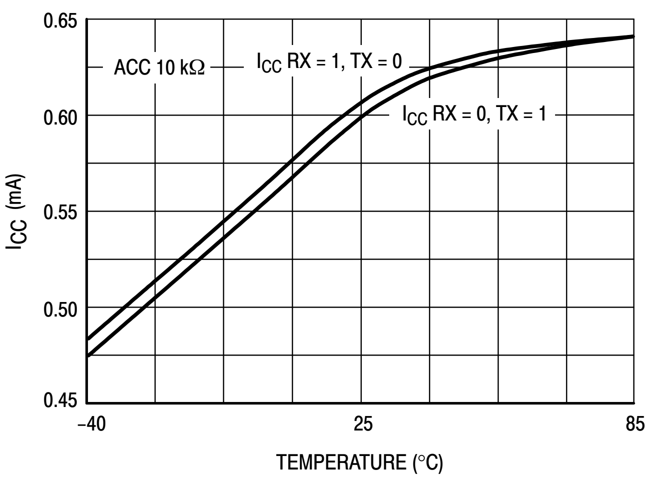


Figure 3. I_{CC} versus Temperature

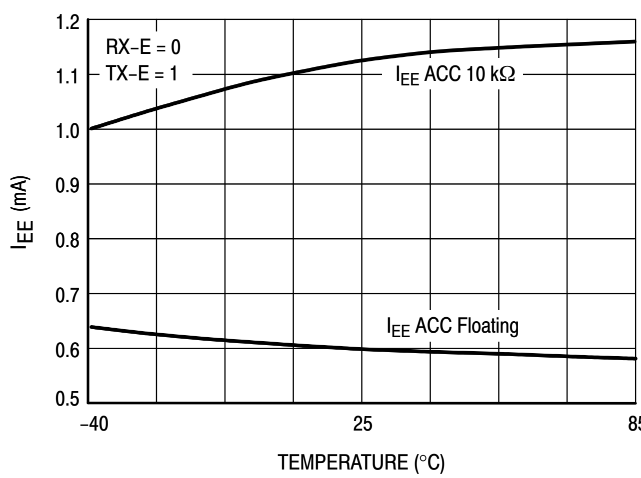


Figure 4. I_{EE} versus Temperature

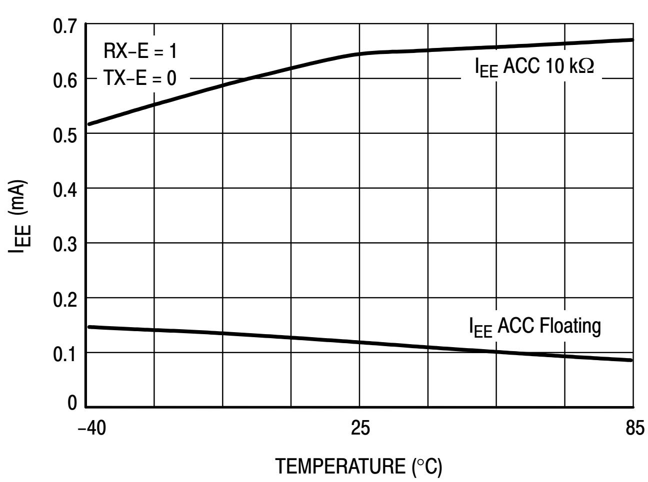


Figure 5. I_{EE} versus Temperature

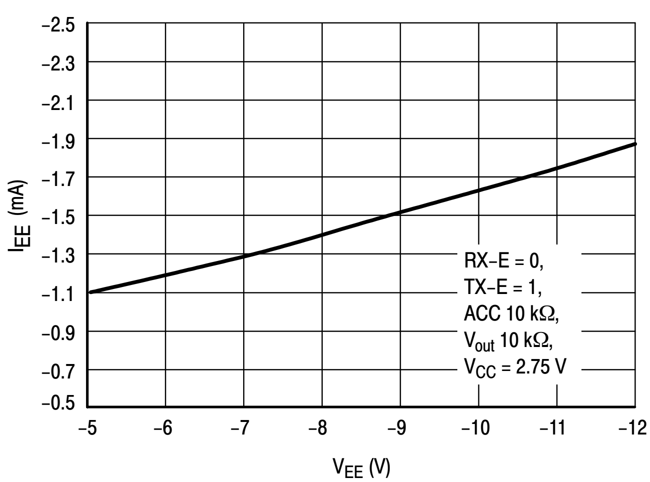


Figure 6. I_{EE} versus V_{EE}

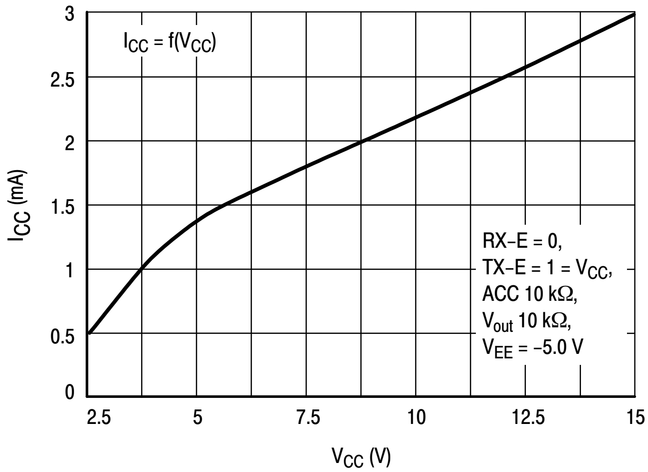


Figure 7. I_{CC} versus V_{CC}

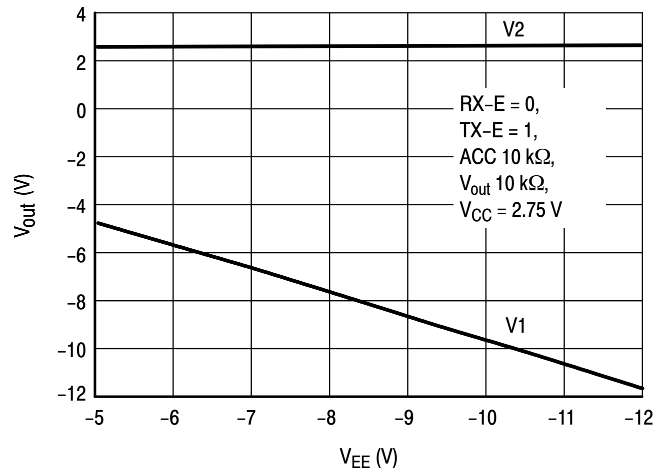


Figure 8. V_{out} versus V_{EE}

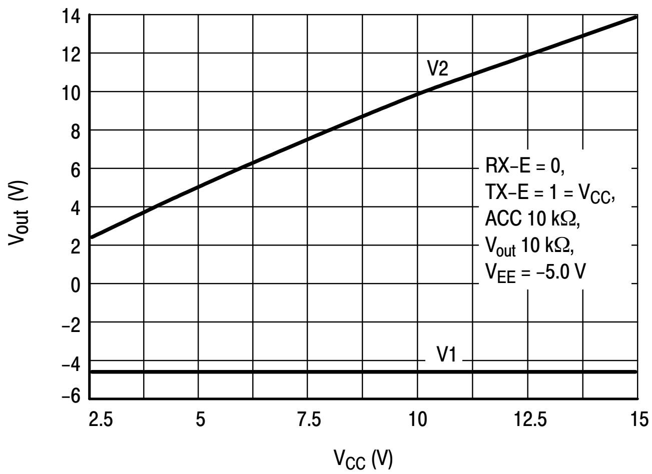


Figure 9. V_{out} versus V_{IH}/V_{CC}

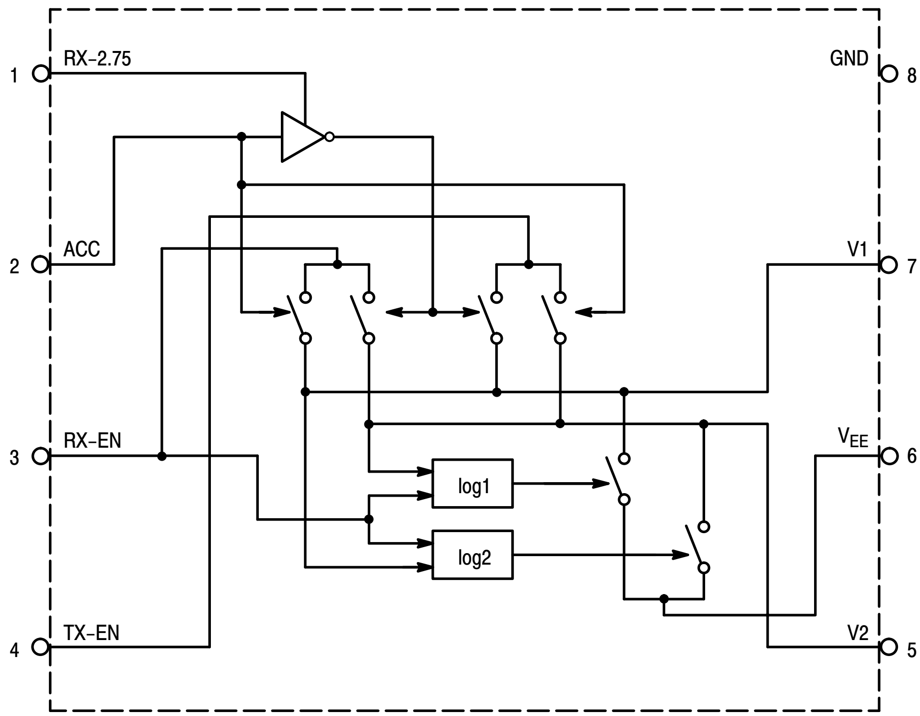


Figure 10. Antenna Switch Controller Block Diagram

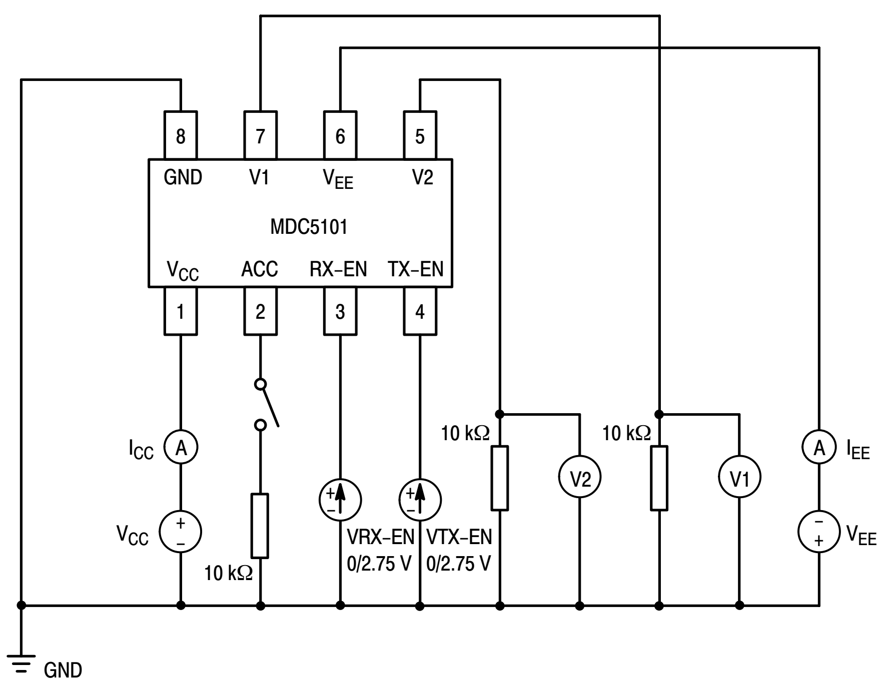


Figure 11. Temperature Measurement Schematic

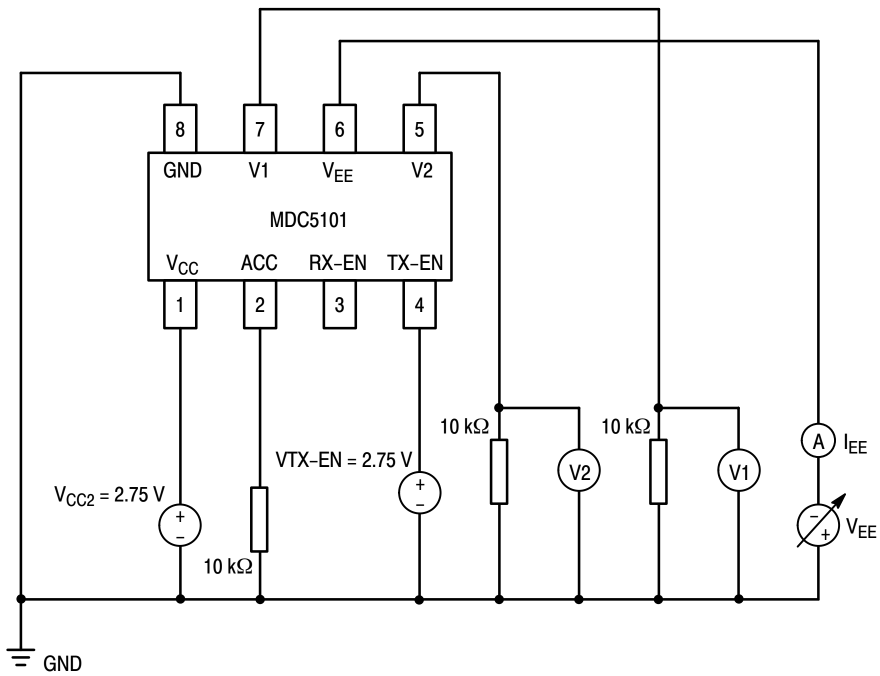


Figure 12. Measurement Schematic
V_{out} vs V_{EE} & I_{EE} vs V_{EE}

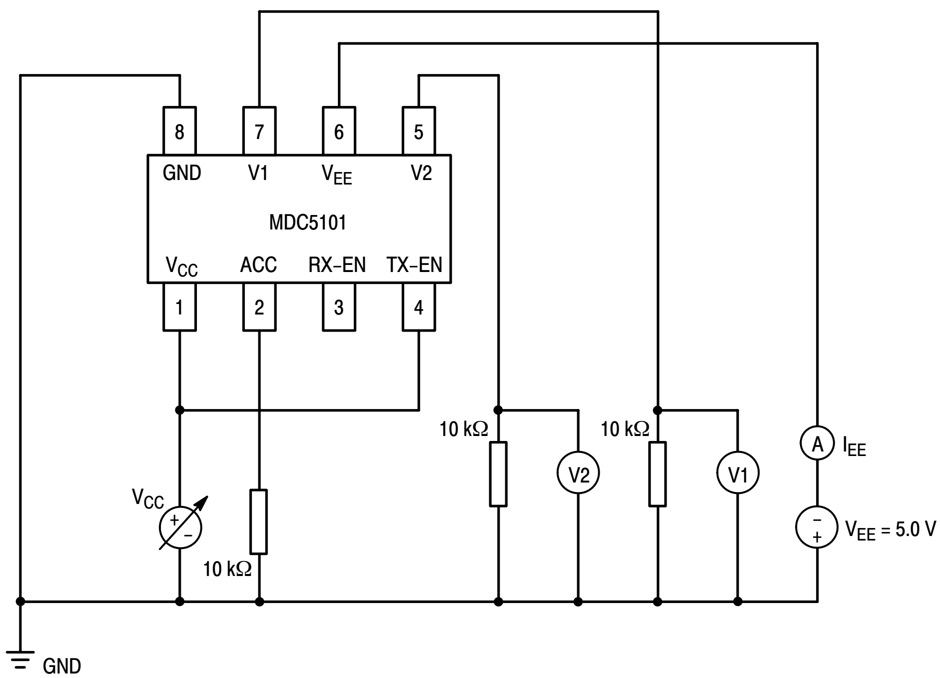
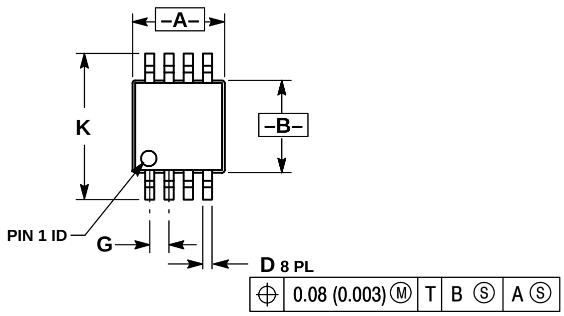
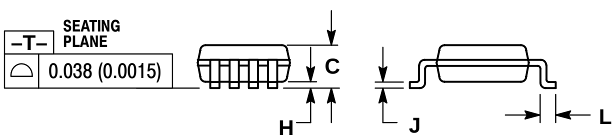


Figure 13. Measurement Schematic
V_{out} vs V_{CC}

PACKAGE DIMENSIONS

Micro8
CASE 846A–02
ISSUE E





NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	---	1.10	---	0.043
D	0.25	0.40	0.010	0.016
G	0.65 BSC		0.026 BSC	
H	0.05	0.15	0.002	0.006
J	0.13	0.23	0.005	0.009
K	4.75	5.05	0.187	0.199
L	0.40	0.70	0.016	0.028

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
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