

Antenna Switch Control

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

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	mA
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

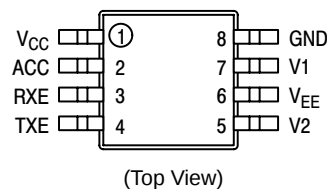
ESD protection on each pin to ± 2500 V per MIL-STD883C method 3015, using human body model of 100 pF, 1500 Ohms and using the machine model to ± 200 V at 100 pF and 0 Ohms. Parts must meet electrical requirement after testing.

MDC5101

ANTENNA SWITCH CONTROLLER



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



MDC5101

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

Characteristic	Symbol	Min	Typ	Max	Unit
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DC PARAMETERS

Positive Power Supply Current V1, V2, ACC 10 k Ω 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	—	μ A
Negative Power Supply Current V1, V2, ACC 10 k Ω to GND, RxE = V _{IL} , TxE = V _{IH}	I _{EE}	–1.5	—	—	mA
High Level Output Voltage I ₁ = I ₂ = 250 μ A, ACC Open RxE = V _{IL} , TxE = V _{IH} RxE = V _{IH} , TxE = V _{IL} I ₁ = I ₂ = 250 μ A, ACC 10 k Ω to GND RxE = V _{IL} , TxE = V _{IH} RxE = V _{IH} , TxE = V _{IL}	V _{OH} (V1) V _{OH} (V2) V _{OH} (V2) V _{OH} (V1)	V _{IH} –0.25 V _{IH} –0.25 V _{IH} –0.25 V _{IH} –0.25			Vdc
Low Level Output Voltage I ₁ = I ₂ = 250 μ A, ACC Open RxE = TxE = V _{IL} RxE = V _{IH} , TxE = V _{IL} I ₁ = I ₂ = 250 μ A, ACC 10 k Ω to GND RxE = TxE = V _{IL} RxE = V _{IH} , TxE = V _{IL}	V _{OL} (V1,V2) V _{OL} (V1) V _{OL} (V1,V2) V _{OL} (V2)	–0.5 –0.5 –0.5 –0.5	0 0	0.5 0.5	Vdc
Low Level Output Voltage I ₁ = I ₂ = 250 μ A, TxE = V _{IH} , RxE = V _{IL} ACC Open ACC 10 k Ω to GND	V _{OL} (V2) V _{OL} (V1)			–4.5 –4.5	Vdc

AC PARAMETERS

Propagation Delay RxE, TxE to V1, V2 ACC Open RxE, TxE to V1, V2 ACC 10 k Ω to GND ACC to V1, V2	t _{PLH} t _{PHL} t _{PLH} t _{PHL} t _{PLH} t _{PHL}	— — — — — —	— — — — — —	1.5 1.5 1.5 1.5 5.0 5.0	μ s
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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 k Ω

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	

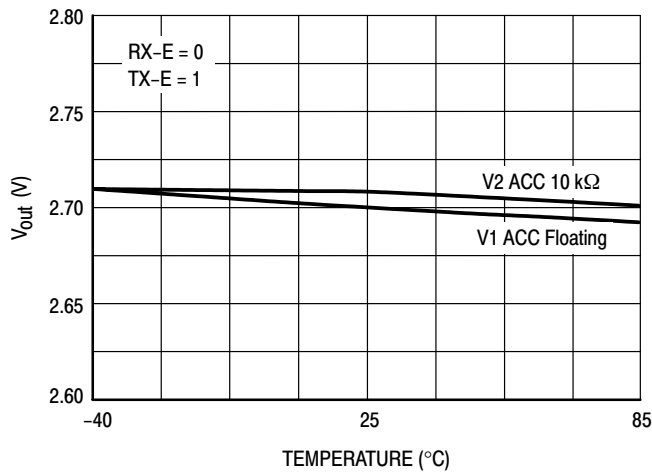


Figure 1. V_{out} (high) versus Temperature

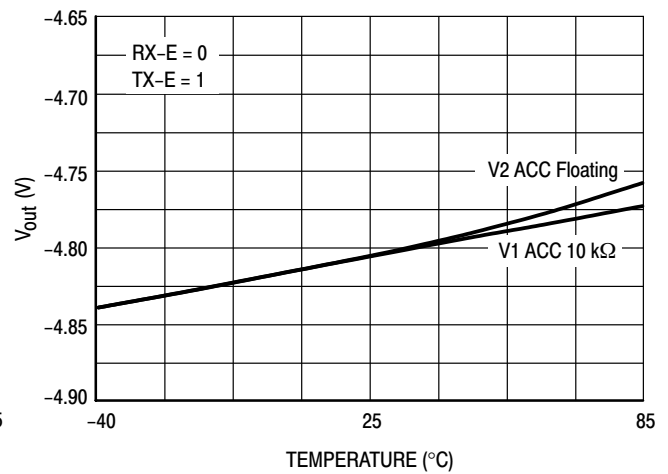


Figure 2. V_{out} (low) versus Temperature

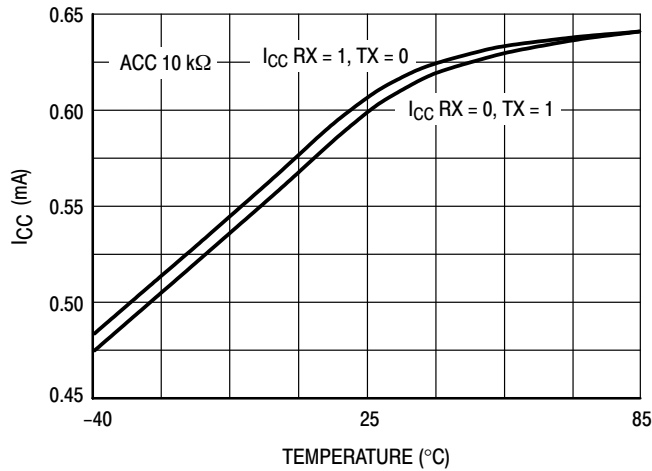


Figure 3. I_{CC} versus Temperature

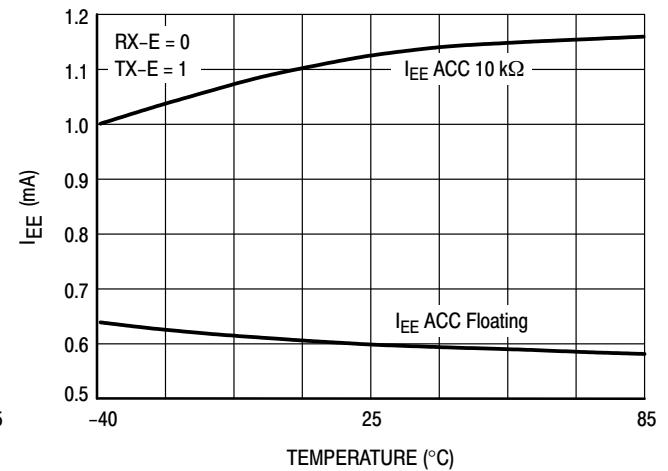


Figure 4. I_{EE} versus Temperature

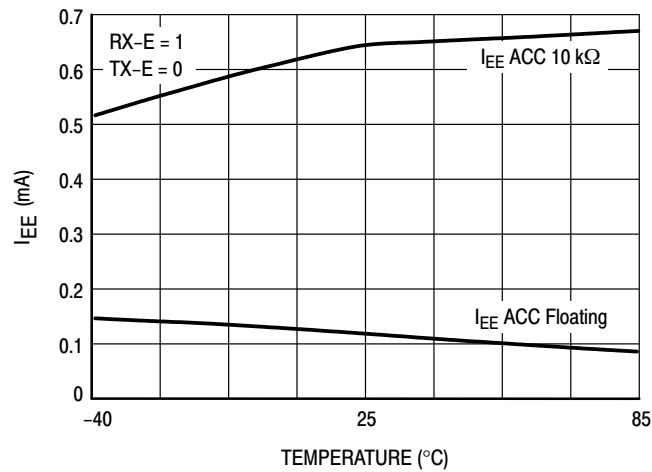


Figure 5. I_{EE} versus Temperature

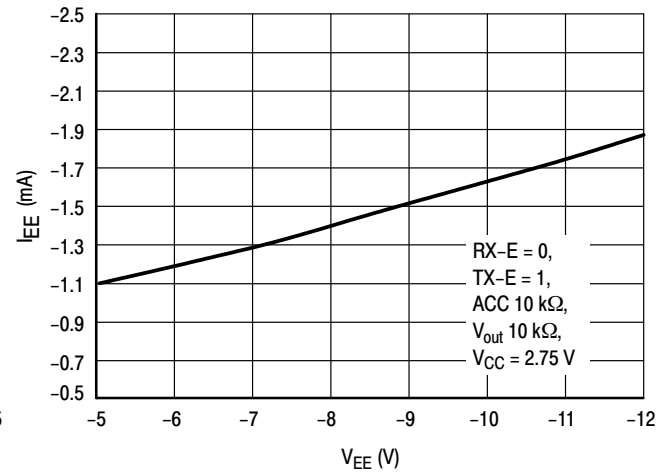


Figure 6. I_{EE} versus V_{EE}

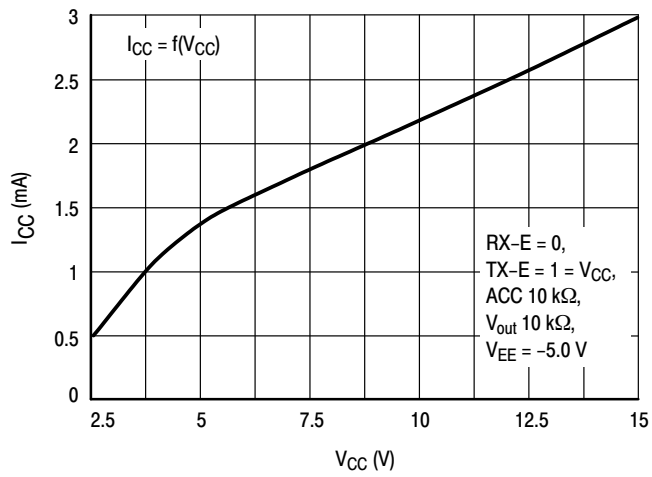


Figure 7. I_{CC} versus V_{CC}

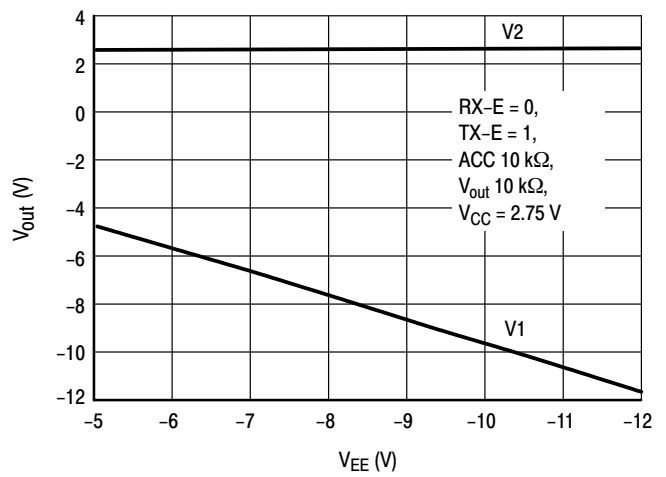


Figure 8. V_{out} versus V_{EE}

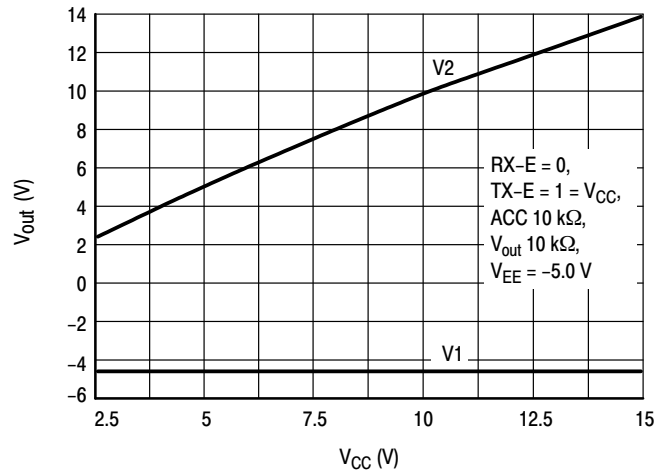


Figure 9. V_{out} versus V_{IH}/V_{CC}

MDC5101

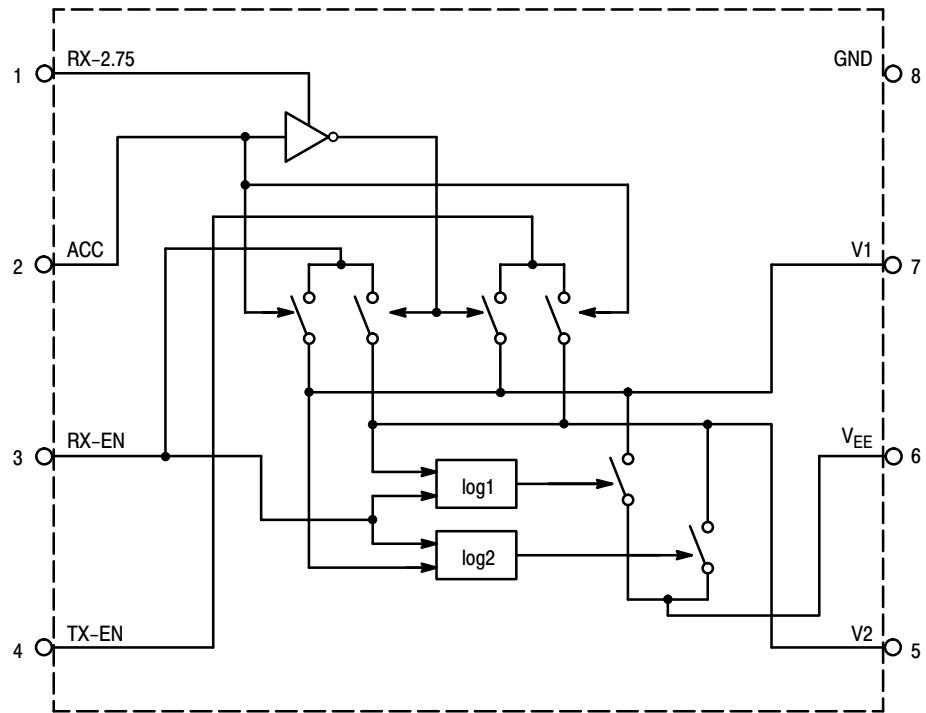


Figure 10. Antenna Switch Controller Block Diagram

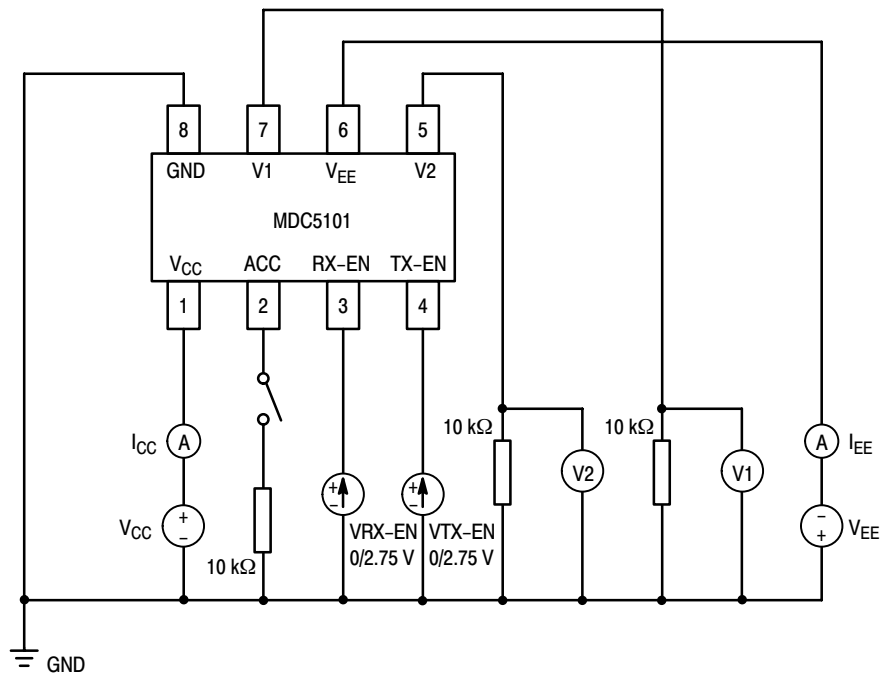


Figure 11. Temperature Measurement Schematic

MDC5101

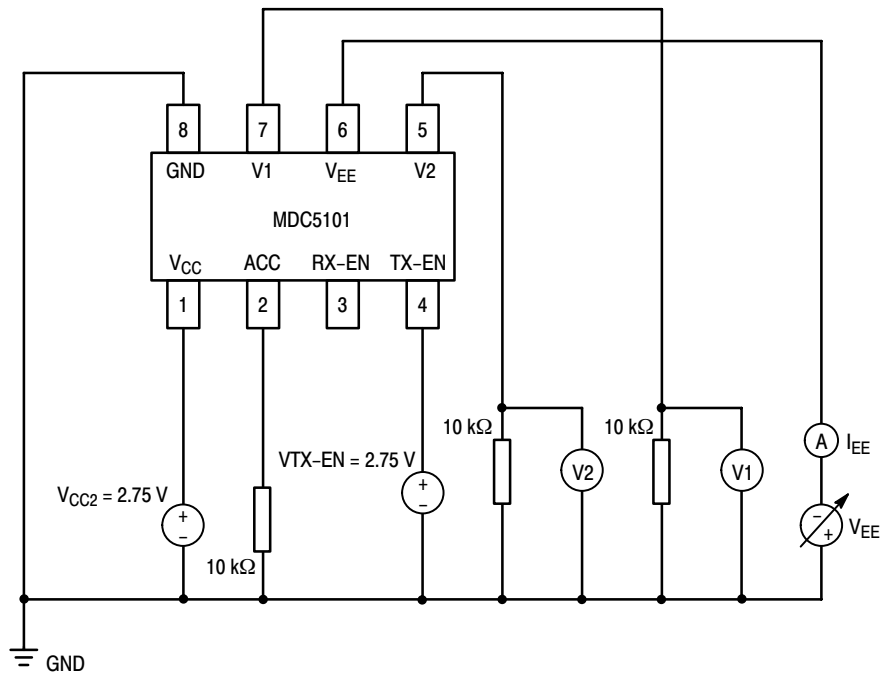


Figure 12. Measurement Schematic
 V_{out} vs V_{EE} & I_{EE} vs V_{EE}

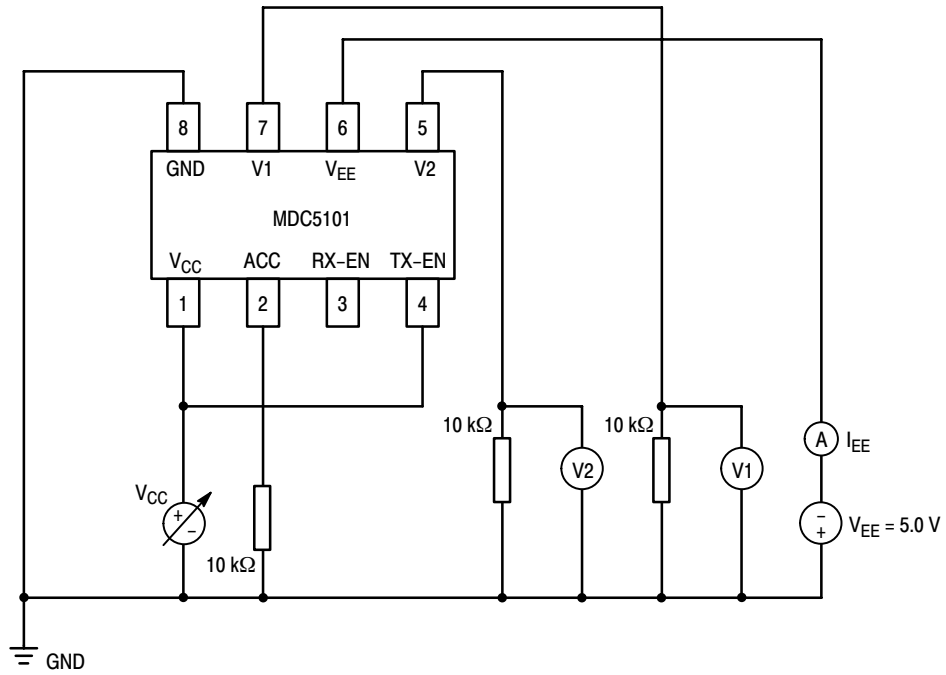
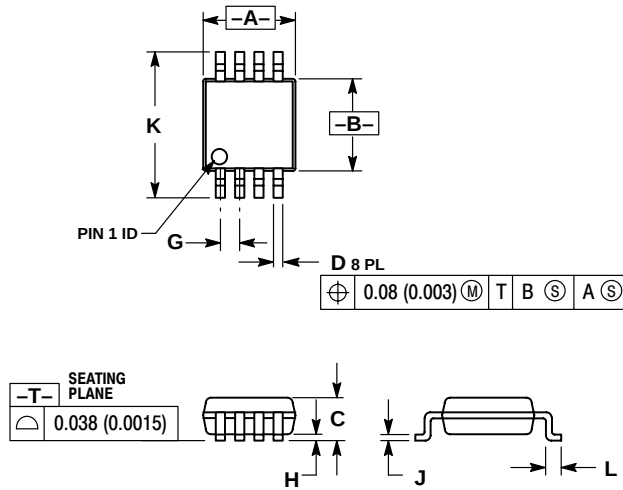


Figure 13. Measurement Schematic
 V_{out} vs V_{CC}

MDC5101

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.

DIM	MILLIMETERS		INCHES	
	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

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