

## Advance Information

# Antenna Switch Controller

The MDC5100 is designed to control GaAs RF switches which require positive and negative going control voltages to select the switch path. All input control signals are 3 V CMOS–logic compatible to allow for direct interface to a microcontroller. The device also has an accessory detect pin for use in applications where there is a portable handset to mobile adapter. The device is designed to interface directly with Double Pull–Double Throw (DPDT) switches such as the M/A–Com SW 363.

This device in combination with a GaAs RF switch can be used to achieve duplex isolation in many Time Division Duplex Radios like DECT or in Frequency Division Duplex Radios employing time division multiple access with staggered Transit/Receive time slots such as GSM. It can also be used to control an RF switch in dual band radio applications. The device is housed in a miniature Micro–8 for minimum space utilization.

### Features

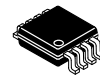
- Micro–miniature Low Profile Micro 8 Package
- 3 V CMOS Logic Control Inputs
- Ultra–low Quiescent Current of 400  $\mu$ A Typical
- Wide Operating Temperature Range of –40 to 85°C

### Applications

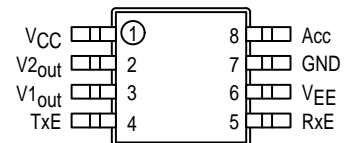
- GSM and PCS Portable Phones
- Mobile to Portable Accessories
- Wireless LAN Modems
- Specialized TDD and TDMA Radios
- Dual Band Phones

**MDC5100**

**ANTENNA  
SWITCH  
CONTROLLER**

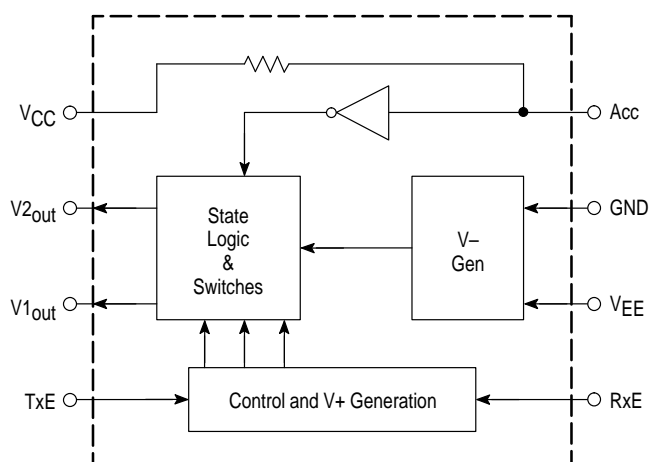


**PLASTIC PACKAGE  
CASE 846A–02  
(Micro–8)**



(Top View)

**Functional Block Diagram**



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# MDC5100

## ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Positive Supply Voltage	$V_{CC}$	6	V
Negative Supply Voltage	$ V_{EE} $	12	V
Differential Supply Voltage	$V_{CC}-V_{EE}$	15	V
Voltage Range at Any Input Pin (TxE, RxE, Acc)	$V_{in}$	-1 to $V_{CC}$	V
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{stg}$	-65 to +150	°C

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Total Power Dissipation Derate above 25°C	$P_D$	510 4	mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	245	°C/W

## DEVICE MARKING

5100
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## ORDERING INFORMATION

MDC5100R2	13 inch Reel, 4000 units
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## TRUTH TABLE

Input Logic			Output Logic		
RxE	TxE	ACC	V1 <sub>out</sub>	V2 <sub>out</sub>	
0	0	0	GND	GND	
0	0	1	GND	GND	
0	1	0	V-	V+	
0	1	1	V+	V-	
1	0	0	V+	V-	
1	0	1	V-	V+	
1	1	0	V+	V+	
1	1	1	V+	V+	Invalid state, should be prohibited in control logic/software

Note 1: ACC "0" = Open, ACC "1" = 10 kΩ to GND

Note 2: V+ is nominally  $V_{IH} - 0.1$

Note 3: V- is nominally  $V_{EE} - 1$  V

## PIN DESCRIPTION

Pin	Name	Functional Description
1	$V_{CC}$	Positive Supply
2	V2 <sub>out</sub>	Antenna Control Output 1, V+ is referenced to the $V_{IH}$ of TxE, RxE and V- is referenced to the $V_{EE}$ Voltage
3	V1 <sub>out</sub>	Antenna Control Output 2, V+ is referenced to the $V_{IH}$ of TxE, RxE and V- is referenced to the $V_{EE}$ Voltage
4	TxE	Transmit Enable Input
5	RxE	Receive Enable Input
6	$V_{EE}$	Negative Supply
7	GND	Ground
8	Acc	Accessory Present Input

**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 2.75\text{ V}$ ,  $V_{EE} = -10\text{ V}$ ,  $T_A = 25^\circ\text{C}$ )

Characteristic	Symbol	Min	Typ	Max	Unit
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**RECOMMENDED OPERATING CONDITIONS**

Positive Supply Voltage	$V_{CC}$	1.8		5.0	V
Negative Supply Voltage	$V_{EE}$	-10		-5.0	V
Voltage Range at Any Input Pin (TxE, RxE, Acc)	$V_{in}$	0		$V_{CC}$	V
Ambient Operating Temperature Range	$T_A$	-40		85	$^\circ\text{C}$

**DC ELECTRICAL CHARACTERISTICS**

Positive Supply Current (Acc connected to GND) Negative Supply Current (Acc, V1, V2 unterminated)	$I_{CC}$ $I_{EE}$	100	400	500 -200	$\mu\text{A}$
RxE or TxE Input High State for V1 or V2 = V+ RxE or TxE Input Low State for V1 or V2 = V-	$V_{IH}$ $V_{IL}$	2.65		0.4	V
V1, V2 Output High State – TxE or RxE = $V_{IH}$ , $I_{OH} = -25\ \mu\text{A}$ (1) V1, V2 Output Low State – TxE or RxE = $V_{IL}$ , $I_{OL} = 25\ \mu\text{A}$ (1)	V+ V-	2.50		-5.75	V
Accessory Resistance for V1 = V-, V2 = V+ (TxE = $V_{IH}$ , RxE = $V_{IL}$ ) Accessory Resistance for V1 = V+, V2 = V- (TxE = $V_{IH}$ , RxE = $V_{IL}$ )	Racc Racc	800		12	$\text{k}\Omega$

**AC ELECTRICAL CHARACTERISTICS**

Propagation Delay – RxE/TxE to V1/V2 (Racc = 800 k $\Omega$ to GND)	$T_{PLH}$ (2) $T_{PHL}$ (2)	0.016 0.004		0.5 1.4	$\mu\text{sec}$ $\mu\text{sec}$
Propagation Delay – RxE/TxE to V1/V2 (Racc = 12 k $\Omega$ to GND)	$T_{PLH}$ $T_{PHL}$	0.35 0.005		4.0 1.4	$\mu\text{sec}$ $\mu\text{sec}$
Propagation Delay – Acc to V1/V2 through 12 k $\Omega$	$T_{PLH}$ $T_{PHL}$	0.4 0.1		7.5 5.0	$\mu\text{sec}$ $\mu\text{sec}$
Transition Time of V1/V2 from RxE or TxE (Racc = 800 k to GND)	$T_{rise}$ (3) $T_{fall}$ (3)	0.3 0.3		7.4 4.4	$\mu\text{sec}$ $\mu\text{sec}$
Transition Time of V1/V2 from RxE or TxE (Racc = 12 k to GND)	$T_{rise}$ $T_{fall}$	0.3 0.2		16 4.0	$\mu\text{sec}$ $\mu\text{sec}$
Transition Time of V1/V2 from Acc Input	$T_{rise}$ $T_{fall}$	0.3 0.3		4.1 4.1	$\mu\text{sec}$ $\mu\text{sec}$

**NOTES:** 1 Refer to truth table for input test states

2.  $T_{PLH}$  and  $T_{PHL}$  are measured from the 50% point of input waveform to 50% of the output waveform

3.  $T_{rise}$  and  $T_{fall}$  are measured from the 10% point to the 90% point of the output

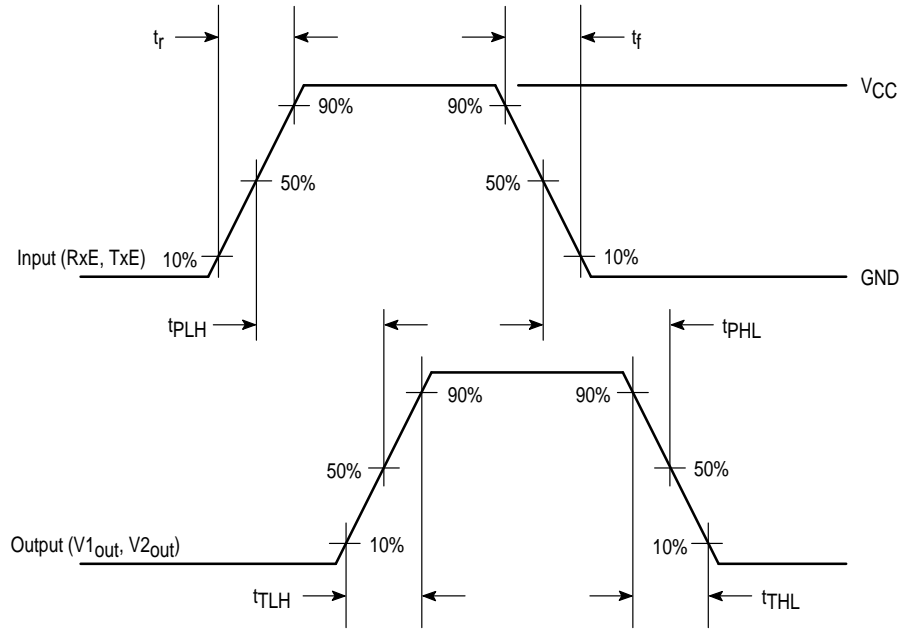


Figure 1.

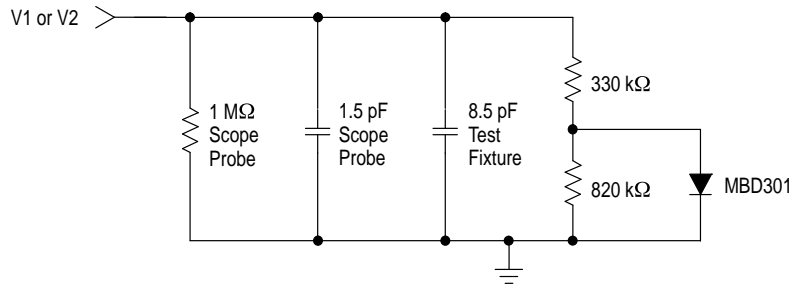


Figure 2. AC Test Load

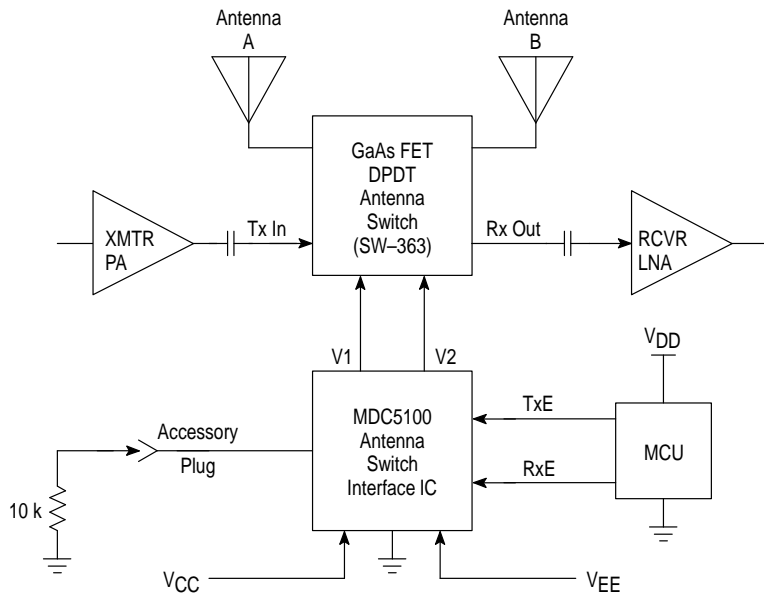


Figure 3. Diversity Antenna Application

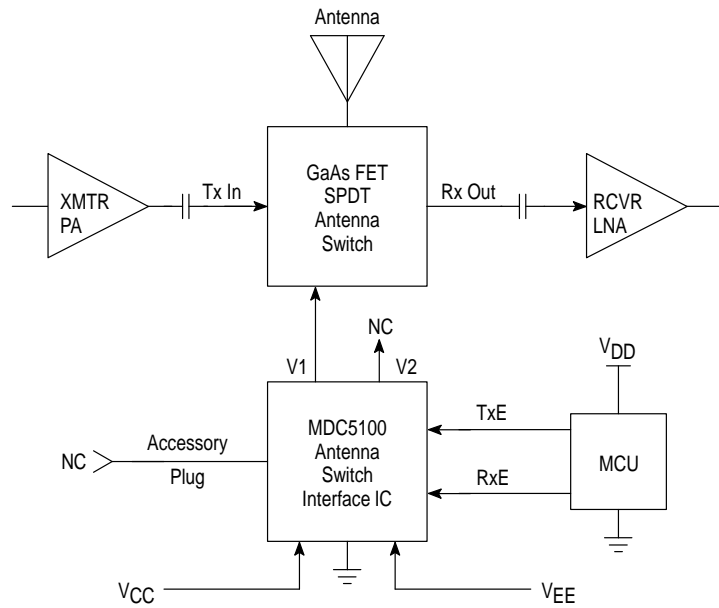
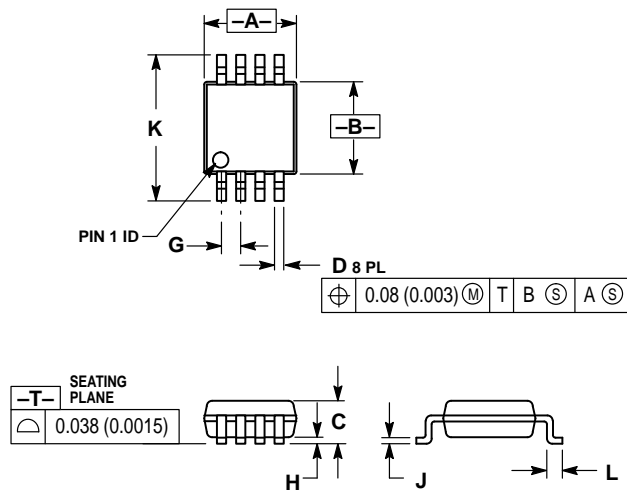


Figure 4. TDD or Half-Duplex Handie-Talkie Application

PACKAGE DIMENSIONS




- 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

CASE 846A-02  
ISSUE D

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4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan. 81-3-5487-8488

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2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.  
852-26668334

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