BCT4567
Low-Power, Dual SIM Card Analog Switch

GENERAL DESCRIPTION

The BCT4567 is a quad-SPDT switch with one common control inputs targeted at dual SIM card multiplexing. It is optimized for switching the WLAN-SIM data and control signals and dedicates one channel as a supply-source switch.

The switches are fully bi-directional, allowing both multiplexing and de-multiplexing operation. Break-before-make operation is guaranteed.

The device operates from a +1.65V to +4.5V supply and over the extended -40°C to +85°C temperature range. It is offered in 16-pin 3mm x 3mm TQFN package or 16-pin 1.8mm x 2.6mm UTQFN package.

FEATURES

- Low 0.5Ω R_{ON} @VCC=2.7V
- 0.06Ω On-Resistance Flatness
- Excellent 0.05Ω On-Resistance Matching
- Wide VCC Operating Range: 1.65 V to 4.5 V
- Rail-to-Rail Signal Switching Range
- Fast Switching Speed：20nsTYP at 3.3V
- High Off Isolation: -66dB
- Crosstalk Rejection: -86dB
- -3dB bandwidth: 100MHz
- Space-Saving, TQFN 3x3-16L or UTQFN 1.8x2.6-16L Package

APPLICATIONS

Dual SIM Card Switch
Cell Phones
Pad
Digital Cameras
PDAs
Notebook

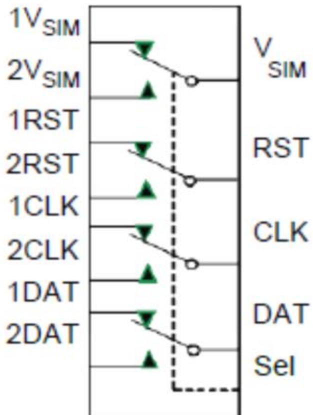
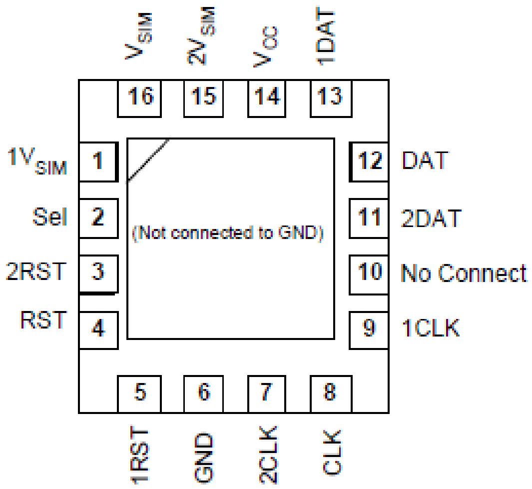


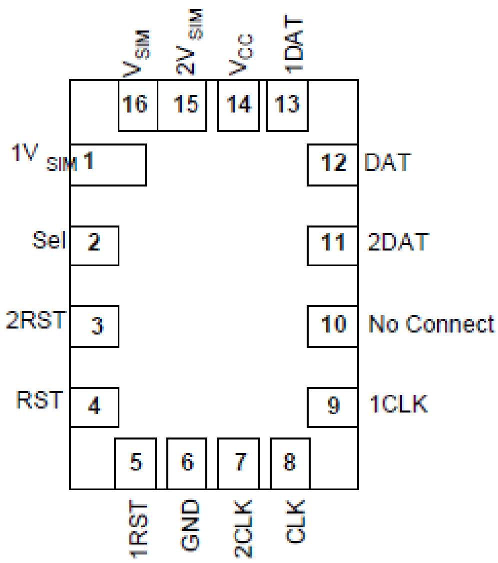
Figure 1. Analog Symbol

ORDERING INFORMATION

Ordering Code	Package Description	Temp Range	Top Marking	QTY/Reel
BCT4567EGE-TR	TQFN3x3-16L	–40°C to +85°C	4567	3000
BCT4567EFE-TR	UTQFN1.8x2.6-16L	–40°C to +85°C	4567	3000

Pin Configurations





Pin Description

Pin	Name	Function
1	1VSIM	SIM supply output 2
2	SEL	Select input
3	2RST	RST Normally Open Terminal
4	RST	RST Common Terminal
5	1RST	RST Normally Closed Terminal
6	GND	Ground
7	2CLK	CLK Normally Open Terminal
8	CLK	CLK Common Terminal
9	1CLK	CLK Normally Closed Terminal
10	NC	Not Connect
11	2DAT	DAT Normally Open Terminal
12	DAT	DAT Common Terminal
13	1DAT	DAT Normally Closed Terminal
14	VCC	Power Supply
15	2VSIM	SIM supply output 1
16	VSIM	SIM supply input

Truth Table

SEL	SWITCH STATE
0	1DAT = DAT, 1RST = RST, 1CLK = CLK, $1V_{SIM} = V_{SIM}$
1	2DAT = DAT, 2RST = RST, 2CLK = CLK, $2V_{SIM} = V_{SIM}$

Absolute Maximum Ratings

VCC, SEL to GND...-0.3V to +6.0V
All Other Pins to GND……….. ……………...-0.3V to (VCC + 0.3V)
Continuous Current ………………………………………………………………….……..... ±400mA
Peak Current (pulsed at 1ms, 10% duty cycle) ……………………………….................±500mA
Continuous Power Dissipation (TA = +70°C) (15.6mW/°C above +70°C) 1.25W
Operating Temperature Range ....-40°C to +85°C
Storage Temperature Range..-65°C to +150°C
Junction Temperature...+150°C
Lead Temperature (soldering, 10s)..+260°C

Stresses beyond 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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

(unless otherwise noted. Typical values are at VCC = 3.3V, TA = +25°C. (Note 2)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
POWER SUPPLY							
Supply Voltage Range	VCC			1.65		4.5	V
Supply Current	ICC	V_{CNTRL} = 0 or V_{CC}, I_{OUT} = 0				1.0	uA
ANALOG SWITCH							
Analog Signal Range	VSW	Switch I/O Voltage		0		VCC	V
On-Resistance	RON	I_{ON} = -100 mA Figure 9	VCC= 1.8V V_{SW} = 0, 1.8 V		0.8		Ω
			VCC= 2.7V V_{SW} = 0, 2.3 V		0.5		
On-Resistance Match	ΔRON	I_{ON} = -100 mA Figure 9	VCC= 1.8V V_{SW} = 0, 1.8 V		0.1		Ω
			VCC= 2.7V V_{SW} = 0, 2.3 V		0.05		
On-Resistance Flatness	RFLAT	I_{ON} = -100 mA Figure 9	VCC= 1.8V V_{SW} = 0, 1.8 V		0.12		Ω
			VCC= 2.7V V_{SW} = 0, 2.3 V		0.06		
Off-Leakage Current	IOFF	VCC= 4.3V, nRST, nDAT, nCLK, nVSIM = 0.3 V or 3.6 V Figure 10		-1		1	uA
On-Leakage Current	ION	VCC= 4.3V, RST, DAT, CLK, VSIM = 0.3 V or 3.6 V		-1		1	uA
SEL DIGITAL INPUTS							
Input-Logic High	VIH	VCC=1.65V to 4.5V,		1.7			V
Input-Logic Low	VIL	VCC=1.65V to 4.5V,				0.4	V
Input Leakage Current	IIN	VIN = 0 or VCC		-1		1	uA

Electrical Characteristics (continued)

(unless otherwise noted. Typical values are at V_{CC} = 3.3V, T_A = +25°C.) (2)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
DYNAMIC CHARACTERISTICS							
Turn-On Time Sel to Output (VSIM,DAT,CLK, RST)	T_{ON}	RL = 50 Ω, CL = 35 Pf, VSW = 1.5 V, Figure 11, Figure 12	T_A = +25°C		20	30	ns
			T_A = T_{MIN} to T_{MAX}			50	
Turn-Off Time Sel to Output (VSIM,DAT,CLK,RST)	T_{OFF}	RL = 50 Ω, CL = 35 pF, VSW = 1.5 V, Figure 11, Figure 12	T_A = +25°C		15	40	ns
			T_A = T_{MIN} to T_{MAX}			50	
Break-Before-Make Time (VSIM,DAT,CLK,RST)	T_{BBM}	R_L = 50 Ω, C_L = 35 pF V_{SW1} = V_{SW2} = 1.5 V Figure 15	T_A = +25°C	2	15		ns
			T_A = T_{MIN} to T_{MAX}	2			
Charge Injection	Q	C_L = 50 pF, R_{GEN} = 0 Ω, V_{GEN} = 0 V			100		pC
On-Channel Bandwidth -3dB (VSIM,DAT,CLK,RST)	BW	R_L = 50 Ω, C_L = 5 pF Figure 16			100		MHz
Off-Isolation (VSIM,DAT,CLK,RST)	V_{ISO}	R_L = 50 Ω, f = 100KHz Figure 17			-66		dB
Crosstalk (VSIM,DAT,CLK,RST)	V_{CT}	R_L = 50 Ω, f = 100KHz Figure 18			-86		dB
VSIM,RST,CLK, DAT Off Capacitance	C_{OFF}	V_{CC} = 3.3 V, Figure 19			8		pF
VSIM,RST,CLK,DAT On Capacitance	C_{ON}	V_{CC} = 3.3 V, f = 1 MHz Figure 20			25		pF

Note 2: Devices are 100% tested at TA = +25℃. Limits across the full temperature range are guaranteed by design and correlation.

Test Diagrams /Timing Diagrams

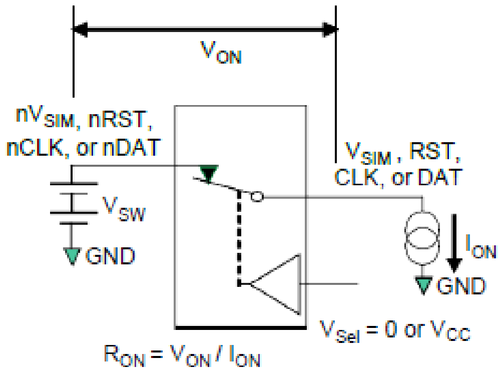


Figure 9. On Resistance

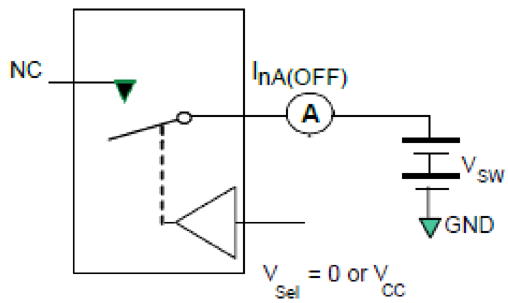
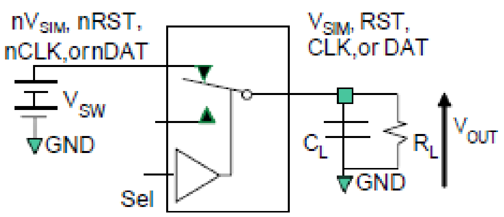


Figure 10. Off Leakage



R_L and C_L are functions of the application environment (see tables for specific values). C_L includes test fixture and stray capacitance.

Figure 11. AC Test Circuit Load

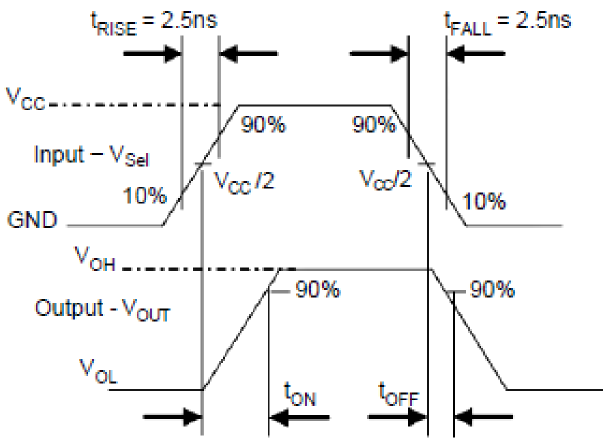


Figure 12. Turn-On / Turn-Off Waveforms

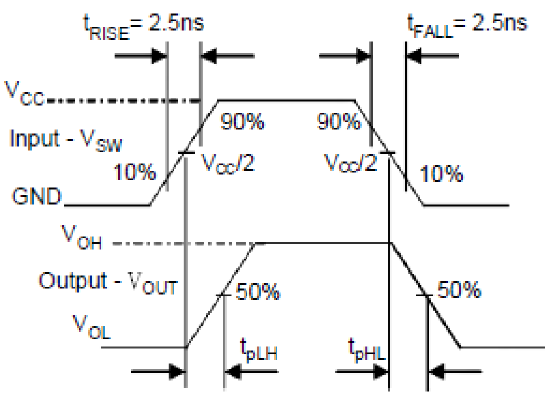


Figure 13. Propagation Delay

Test Diagrams /Timing Diagrams

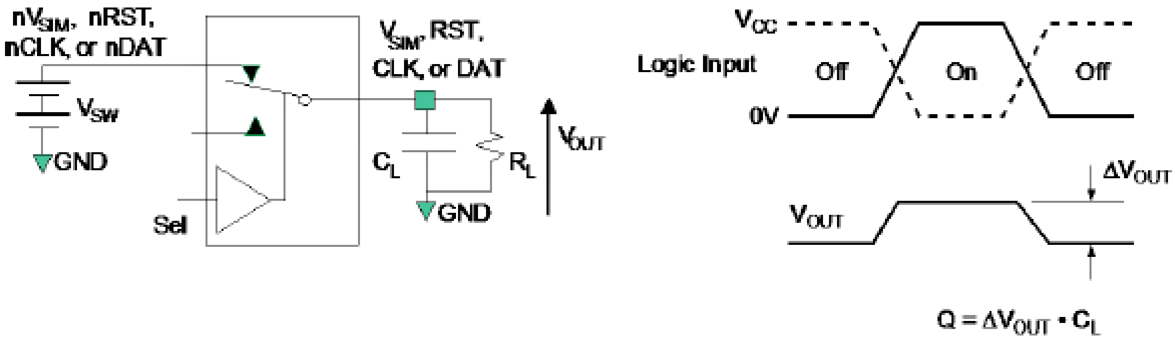
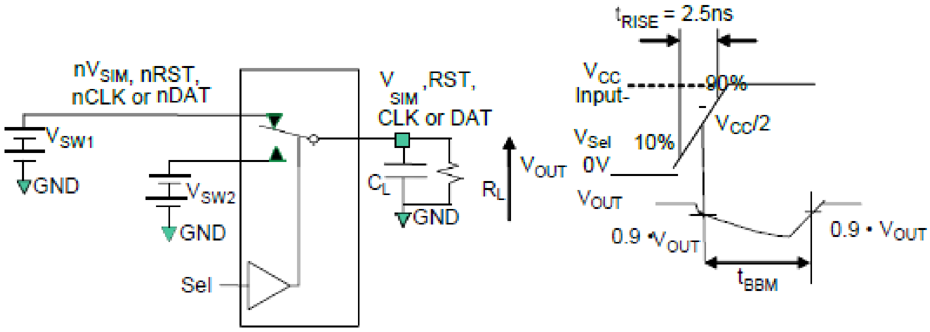
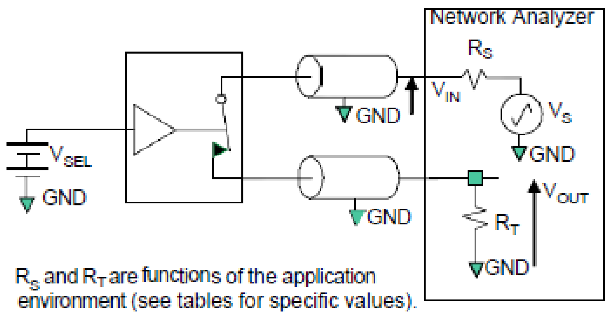


Figure 14. Charge Injection



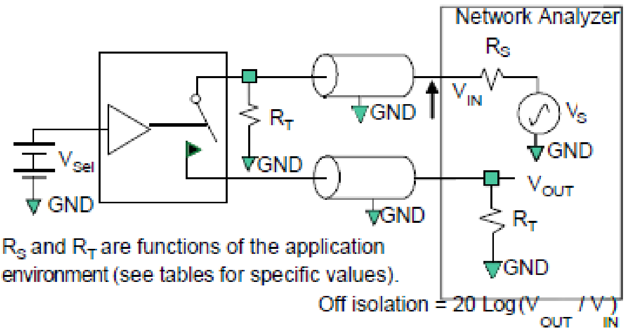
R_L and C_L are functions of the application environment (see tables for specific values). C_L includes test fixture and stray capacitance.

Figure 15. Break-Before-Make Interval Timing



R_S and R_T are functions of the application environment (see tables for specific values).

Figure 16. Bandwidth



R_S and R_T are functions of the application environment (see tables for specific values).

Figure 17. Channel Off Isolation

Test Diagrams /Timing Diagrams

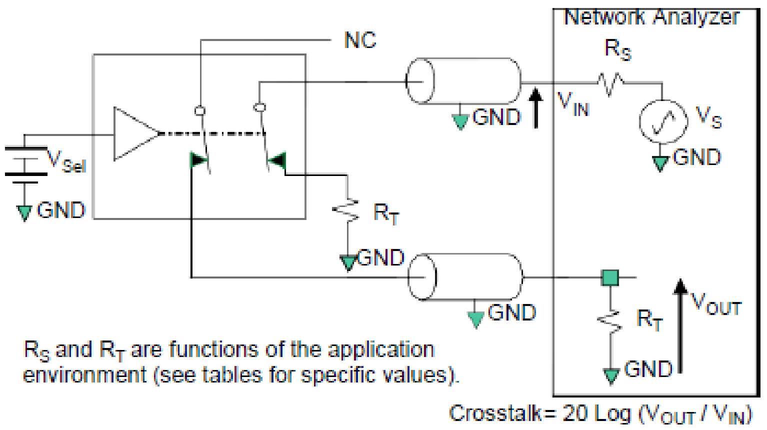


Figure 18. Non-Adjacent Channel-to-Channel Crosstalk

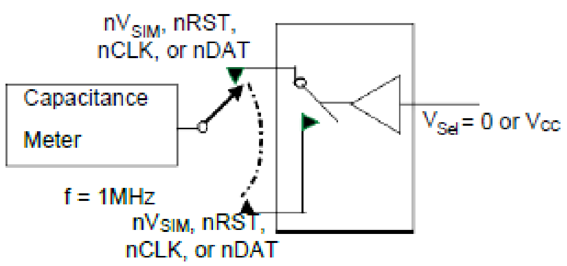


Figure 19. Channel Off Capacitance

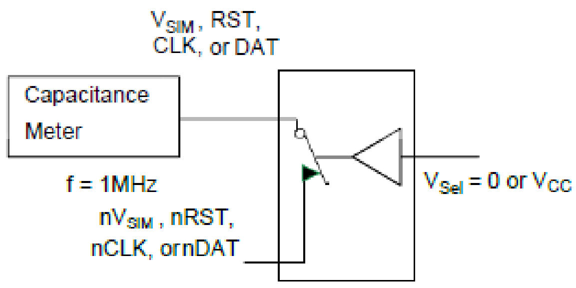
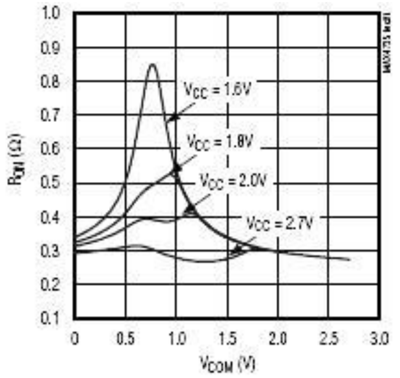


Figure 20. Channel On Capacitance

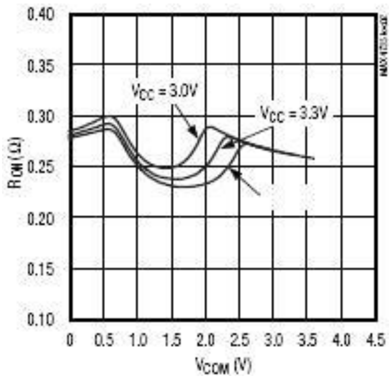
Typical Operating Characteristics

(VCC = 3V, TA = +25°C, unless otherwise noted.)

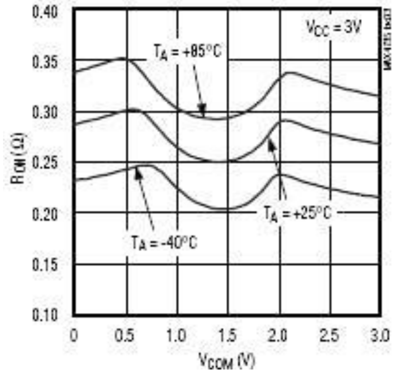
ON-RESISTANCE vs. COM_ VOLTAGE



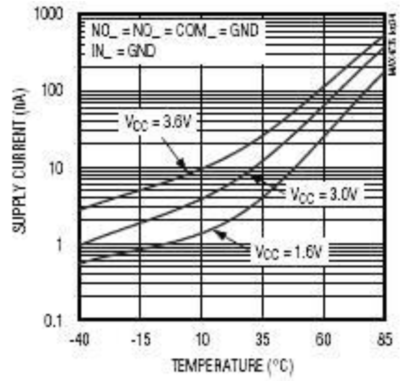
ON-RESISTANCE vs. COM_ VOLTAGE



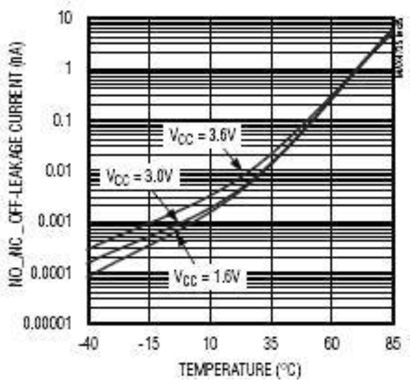
ON-RESISTANCE vs. COM_ VOLTAGE AND TEMPERATURE



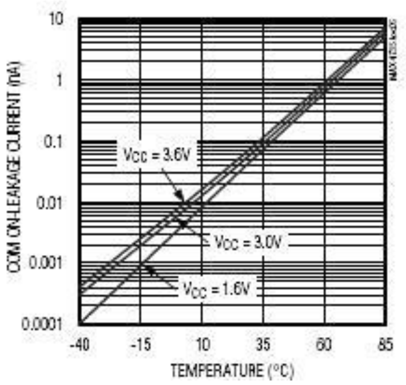
SUPPLY CURRENT vs. TEMPERATURE



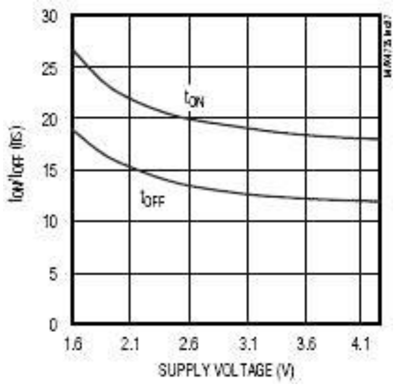
NO /NC OFF-LEAKAGE CURRENT vs. TEMPERATURE



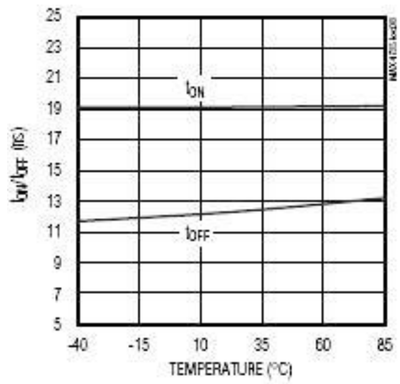
COM ON-LEAKAGE CURRENT vs. TEMPERATURE



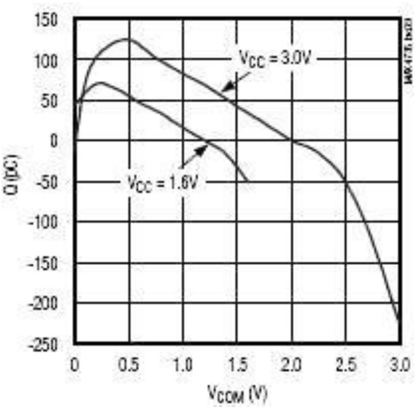
TURN-ON/OFF TIME vs. SUPPLY VOLTAGE



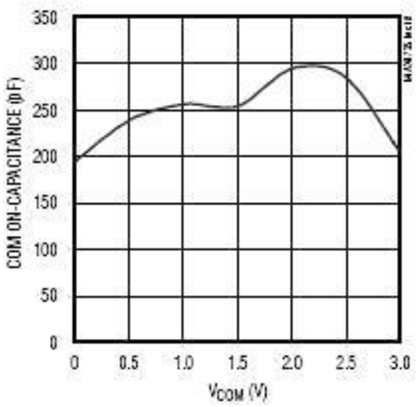
TURN-ON/OFF TIME vs. TEMPERATURE



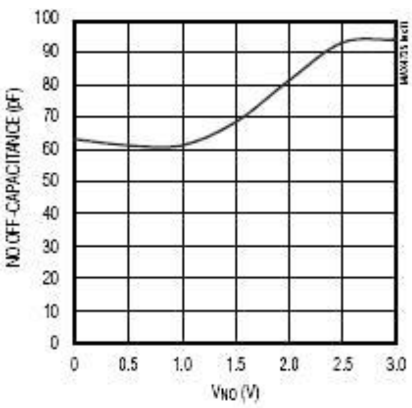
CHARGE INJECTION vs. COM_ VOLTAGE



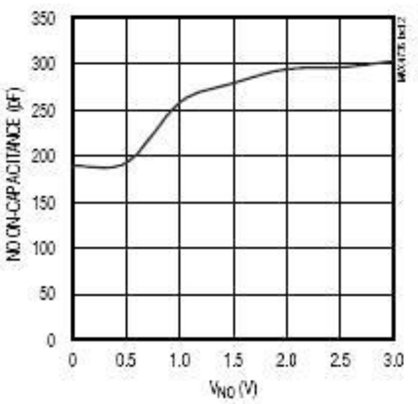
COM_ ON-CAPACITANCE vs. COM_ VOLTAGE



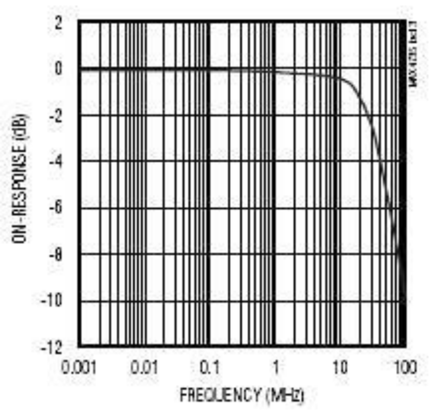
NO_ OFF-CAPACITANCE vs. NO_ VOLTAGE



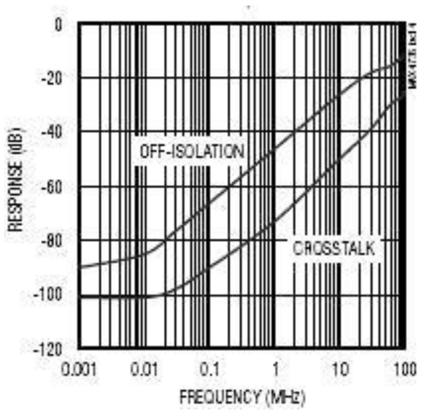
NO_ ON-CAPACITANCE vs. NO_ VOLTAGE



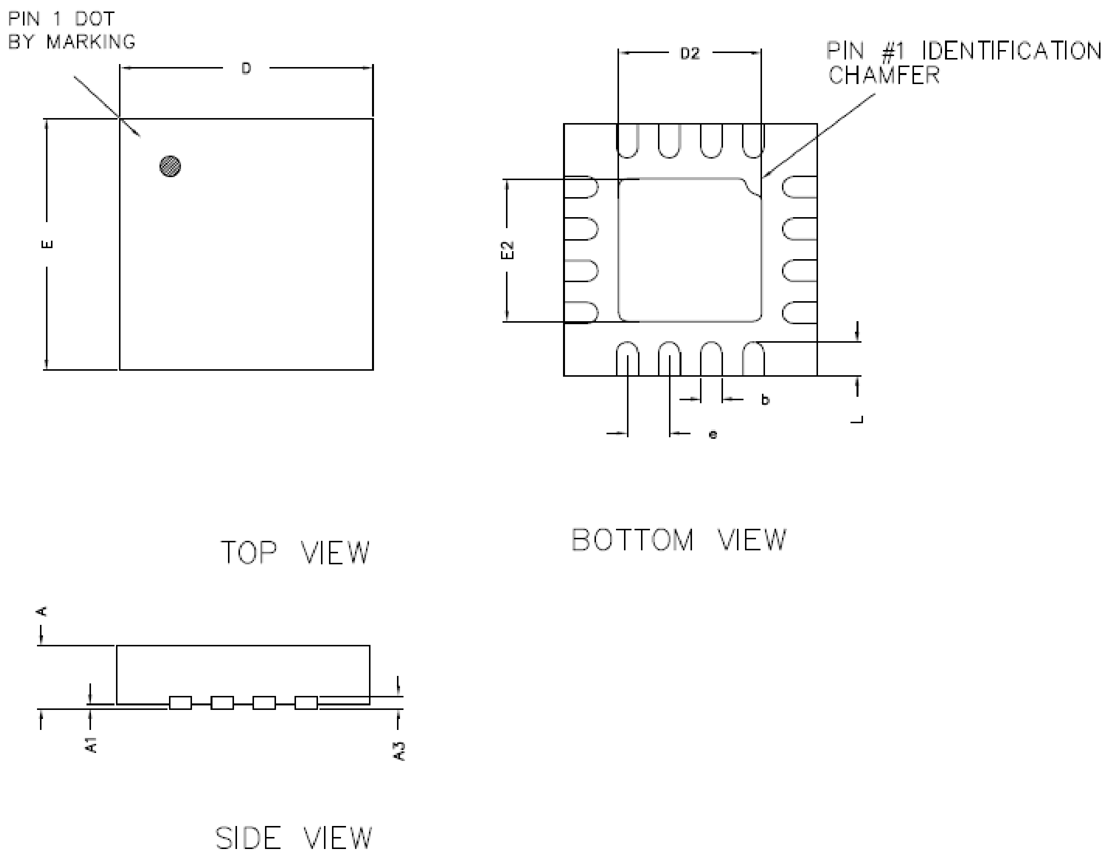
ON-RESPONSE vs. FREQUENCY



OFF-ISOLATION AND CROSSTALK vs. FREQUENCY

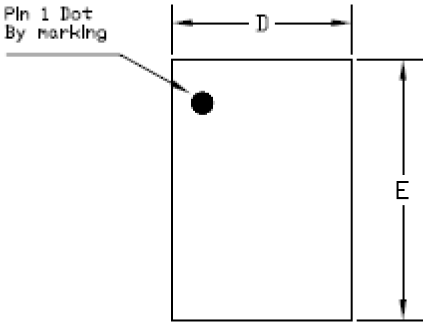


PACKAGE OUTLINE DIMENSIONS: TQFN 3x3 -16L

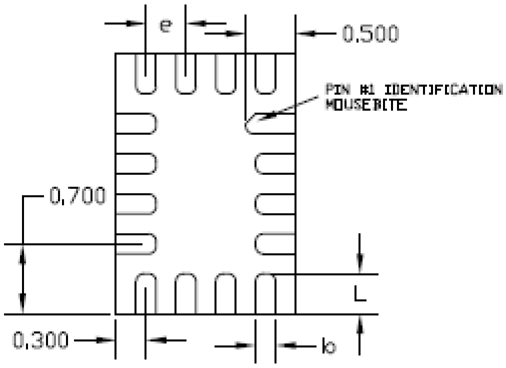


COMMON DIMENSIONS(MM)			
PKG.	W: VERY VERY THIN		
REF.	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	–	0.05
A3	0.2 REF.		
D	2.95	3.00	3.05
E	2.95	3.00	3.05
b	0.18	0.25	0.30
L	0.30	0.40	0.50
D2	1.55	1.70	1.80
E2	1.55	1.70	1.80
e	0.5 BSC		

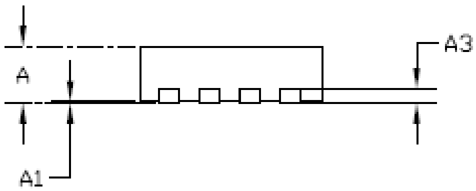
PACKAGE OUTLINE DIMENSIONS: UTQFN 1.8x2.6 -16L



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS(MM)			
PKG.	UT:ULTRA THIN		
REF.	MIN.	NOM.	MAX
A	>0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 REF.		
D	1.75	1.80	1.85
E	2.55	2.60	2.65
L	0.30	0.40	0.50
b	0.15	0.20	0.25
e	0.40 BSC		