

GT4717

3 Ω , 600MHz Bandwidth, Dual, SPDT Negative Signal Handling Analog Switch

1 Features	2 Application
- Supply range: +2.5V to +5.5V - -3.0V to V₊ Signal Passing Ability - On-Resistance: 3 Ω(TYP) @+4.5V - High Bandwidth:600MHz - Fast Switching Times: T_{ON} 23ns T_{OFF} 12ns - Off-Isolation:-42dB@10MHz - TTL/CMOS compatible - Break-before-make switching - Operation temperature range: -40°C to 85°C - Micro size packages: QFN-1.4×1.8-10L, MSOP-10	- Portable instrumentation - Battery-Operated equipment - Computer peripherals - Cell phones - PDAs

3 Description	Circuit Diagram
The GT4717 is a dual-channel single-pole double-throw (SPDT) analog switch that is designed to operate from 2.5V to 5.5V. The device can handle negative signal down to -3V. It features high-bandwidth (600 MHz) and low on-resistance (3Ω@4.5V). This device is available packaged in QFN-1.4×1.8-10L and MSOP-10.	

4 Revision History

Revision	Date	Note
Rev. A0. 1	2025. 01. 05	Original Version
Rev. A1. 0	2025. 04. 24	Official Version

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

5 Device Summary, Pin and Packages

Table 5-1. Device Summary⁽¹⁾

Serial Name	Part Name	Package	Body Size (Nom)	Marking ⁽²⁾⁽⁴⁾	MSL ⁽³⁾	Package Qty
GT4717	GT4717QA	QFN1.4×1.8-10L	1.4mm×1.8mm×0.5mm	4717 XXXX	3	Tape and Reel,4000
	GT4717MA	MSOP-10	3.0mm×3.0mm×0.85mm	GT4717 XXXXXXX	3	Tape and Reel,4000

(1) For all available packages, please contact product.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.

5 Device Summary, Pin and Packages(Continued)

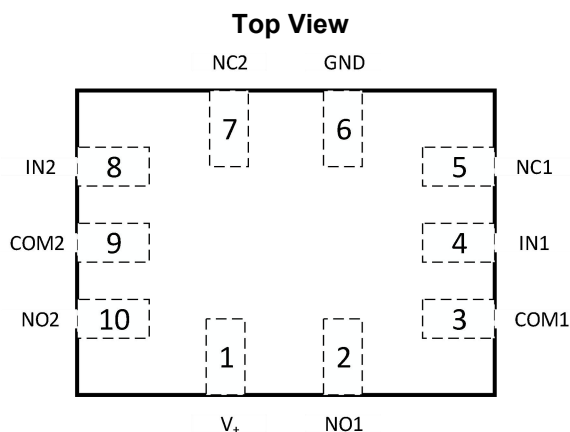


Fig.5-1. GT4717: QA (QFN1.4x1.8-10L) Package

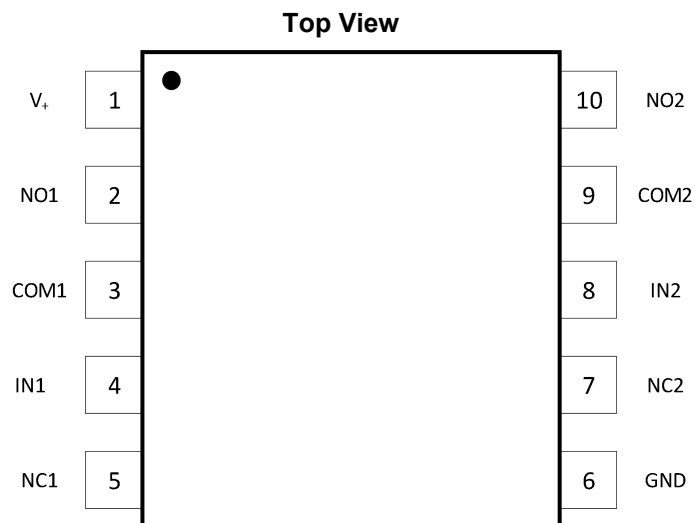


Fig.5-2. GT4717: MA (MSOP-10) Package

Table 5-2 Pin definition

Pin		Description
Name	QA MA	
V+	1	Supply Voltage
NO1	2	Normal open terminal switch 1
COM1	3	Common terminal switch 1
IN1	4	Select input, control switch 1
NC1	5	Normal closed terminal switch 1
GND	6	Ground
NC2	7	Normal closed terminal switch 2
IN2	8	Select input, control switch 2
COM2	9	Common terminal switch 2
NO2	10	Normal open terminal switch 2

Table 5-3 Function Table

LOGIC	Function
0	NC connected to COM
1	NO connected to COM

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings⁽¹⁾

Parameters		Min.	Max.	Unit
V ₊	Supply voltage range	-0.3	6.0	V
V _{IN}	Analog, digital voltage range ⁽²⁾	(V ₊)-6	(V ₊)+0.3	V
	Continuous current NO,NC or COM	-50	+50	mA
I _{peak}	Continuous channel current	-80	+80	mA
T _J	Junction temperature under bias	-65	150	°C
T _{stg}	Storage temperature range	-65	150	°C

(1) 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 under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM) ⁽¹⁾	8 K	V
		Charged-Device Model (CDM) ⁽²⁾	2 K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions⁽¹⁾

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	Min	Max	Units
V ₊	Supply voltage	2.5	5.5	V
V _{IN}	Control input voltage	0	V ₊	V
	Switch input voltage	(V ₊)-5.5	V ₊	V
V _{OUT}	Output voltage	(V ₊)-5.5	V ₊	V
T _A	Ambient temperature	-40	85	°C

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
QFN1.4×1.8-10L	120	46	°C/W
MSOP-10	180.7	66.2	°C/W

7 Electrical Specifications

$V_+ = 4.5V$ to $5.5V$, FULL = $-40^\circ C$ to $+85^\circ C$, Typical values are at $T_A = +25^\circ C$ (unless otherwise noted)

Parameter	Symbol	Conditions	V_+	Temp	Min	Typ	Max	Units
Analog switch								
Analog Signal Range	V_{NO}, V_{NC}, V_{COM}			Full	$(V_+) - 5.5$		V_+	V
On-Resistance	R_{ON}	V_{NO} or $V_{NC} = 3.5V$, $I_{COM} = -10mA$	4.5V	$+25^\circ C$		3		Ω
On-Resistance Match Between Channels	ΔR_{ON}	V_{NO} or $V_{NC} = 3.5V$, $I_{COM} = -10mA$	4.5V	$+25^\circ C$		0.07		Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	$0 \leq V_{NO}$ or $V_{NC} \leq V_+$, $I_{COM} = -10mA$	4.5V	$+25^\circ C$		0.75		Ω
NC, NO Off Leakage Current	$I_{NC(OFF)}, I_{NO(OFF)}$	V_{NO} or $V_{NC} = 1V$, 4.5V, $V_{COM} = 4.5V$, 1V	5.5V	Full		0.1		μA
NC, NO, COM On Leakage Current	$I_{NC(ON)}, I_{NO(ON)}, I_{COM(ON)}$	$V_{COM} = 1V$, 4.5V, V_{NO} or $V_{NC} = 1V$, 4.5V, or floating	5.5V	Full		0.1		μA
Power Off Leakage Current	$I_{POWER OFF}$	V_{NO} or $V_{NC} = 0V$, $V_{COM} = 5V$	0V	Full		0.5		μA
Digital inputs								
Input High Voltage	V_{INH}		5.5 V	Full	1.8			V
Input Low Voltage	V_{INL}		5.5 V	Full			0.4	V
Input Leakage Current	I_{IN}	$V_{IN} = V_+$ or 0	5.5 V	Full		0.1		μA
Dynamic characteristics								
Turn-On Time	t_{ON}	V_{NO} or $V_{NC} = 3V$, $V_{IH} = 1.8V$, $V_{IL} = 0$, $R_L = 300\Omega$, $C_L = 35pF$	4.5V	$+25^\circ C$		23		ns
Turn-Off Time	t_{OFF}	V_{NO} or $V_{NC} = 3V$, $V_{IH} = 1.8V$, $V_{IL} = 0$, $R_L = 300\Omega$, $C_L = 35pF$	4.5V	$+25^\circ C$		12		ns
Break-Before-Make Time Delay	t_D	V_{NO1} or $V_{NC1} = V_{NO2}$ or $V_{NC2} = 3V$, $R_L = 300\Omega$, $C_L = 35pF$	5V	$+25^\circ C$		8		ns
Skew	t_{SKEW}	$R_S = 39\Omega$, $C_L = 50pF$	5V	$+25^\circ C$		1		ns
Off Isolation	O_{ISO}	$R_L = 50\Omega$, $C_L = 5pF$	$f = 10MHz$	5V	$+25^\circ C$	-42		dB
			$f = 1MHz$	5V	$+25^\circ C$	-63		dB
Channel-to-Channel Crosstalk	X_{TALK}	$R_L = 50\Omega$, $C_L = 5pF$	$f = 10MHz$	5V	$+25^\circ C$	-44		dB
			$f = 1MHz$	5V	$+25^\circ C$	-65		dB
-3dB Bandwidth	BW	$R_L = 50\Omega$, $C_L = 5pF$	5V	$+25^\circ C$		600		MHz
Charge Injection	Q	$V_G = 0$, $R_G = 0$, $C_L = 1nF$	5V	$+25^\circ C$		13		pC
Switch ON Capacitance	C_{ON}		5V	$+25^\circ C$		16		pF
Switch OFF Capacitance	C_{OFF}		5V	$+25^\circ C$		7		pF
Total Harmonic Distortion	THD	V_{NO} or $V_{NC} = 2V_{pp}$, $f = 20Hz$ to $20KHz$	$R_L = 600\Omega$	5V	$+25^\circ C$	0.012		%
Power requirements								
Power Supply Current	I_+	$V_{IN} = GND$ or V_+	5.5 V	Full		1		μA

7 Electrical Specifications (Continued)

V₊=2.7V to 3.6V, FULL= -40°C to +85°C, Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions	V ₊	Temp	Min	Typ	Max	Units
Analog switch								
Analog Signal Range	V _{NO} , V _{NC} , V _{COM}			Full	(V ₊)-5.5		V ₊	V
On-Resistance	R _{ON}	V _{NO} or V _{NC} =1.5V, I _{COM} =-10mA	2.7V	+25°C		3.75		Ω
On-Resistance Match Between Channels	Δ R _{ON}	V _{NO} or V _{NC} =1.5V, I _{COM} =-10mA	2.7V	+25°C		0.1		Ω
On-Resistance Flatness	R _{FLAT(ON)}	0≤V _{NO} or V _{NC} ≤V ₊ , I _{COM} =-10mA	2.7V	+25°C		1.7		Ω
NC, NO Off Leakage Current	I _{NC(OFF)} , I _{NO(OFF)}	V _{NO} or V _{NC} =0.3V, 3V, V _{COM} =3V, 0.3V	3.6V	Full		0.1		μA
NC, NO, COM On Leakage Current	I _{NC(ON)} , I _{NO(ON)} , I _{COM(ON)}	V _{COM} =0.3V, 3V, V _{NO} or V _{NC} =0.3V, 3V, or floating	3.6V	Full		0.1		μA
Power Off Leakage Current	I _{POWER OFF}	V _{NO} or V _{NC} =0V, V _{COM} =3.3V	0V	Full		0.5		μA
Digital inputs								
Input High Voltage	V _{INH}		3.6V	Full	1.8			V
Input Low Voltage	V _{INL}		3.6V	Full			0.4	V
Input Leakage Current	I _{IN}	V _{IN} =V ₊ or 0	3.6V	Full		0.1		μA
Dynamic characteristics								
Turn-On Time	t _{ON}	V _{NO} or V _{NC} =1.5V, V _{IH} =1.8V, V _{IL} =0, R _L =300Ω, C _L =35pF	2.7V	+25°C		30		ns
Turn-Off Time	t _{OFF}	V _{NO} or V _{NC} =1.5V, V _{IH} =1.8V, V _{IL} =0, R _L =300Ω, C _L =35pF	2.7V	+25°C		12		ns
Break-Before-Make Time Delay	t _D	V _{NO1} or V _{NC1} =V _{NO2} or V _{NC2} =1.5V, R _L =300Ω, C _L =35pF	3.3V	+25°C		9		ns
Skew	t _{SKEW}	R _S =39Ω, C _L =50pF	3.3V	+25°C		1		ns
Off Isolation	O _{ISO}	R _L =50Ω, C _L =5pF	f=10MHz	3.3V	+25°C		-42	dB
			f=1MHz	3.3V	+25°C		-63	dB
Channel-to-Channel Crosstalk	X _{TALK}	R _L =50Ω, C _L =5pF	f=10MHz	3.3V	+25°C		-44	dB
			f=1MHz	3.3V	+25°C		-65	dB
-3dB Bandwidth	BW	R _L =50Ω, C _L =5pF	3.3V	+25°C		600		MHz
Charge Injection	Q	V _G =0, R _G =0, C _L =1nF	3.3V	+25°C		10		pC
Switch ON Capacitance	C _{ON}		3.3V	+25°C		16		pF
Switch OFF Capacitance	C _{OFF}		3.3V	+25°C		7		pF
Total Harmonic Distortion	THD	V _{NO} or V _{NC} =2Vpp, f=20Hz to 20KHz	R _L =600Ω	3.3V	+25°C		0.023	%
Power requirements								
Power Supply Current	I ₊	V _{IN} =GND or V ₊	3.6 V	Full		1		μA

8 Typical Characteristics

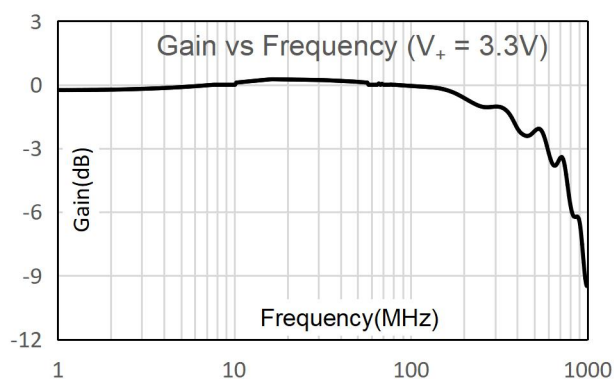


Fig.8-1. Bandwidth vs Frequency at 3.3V V_+

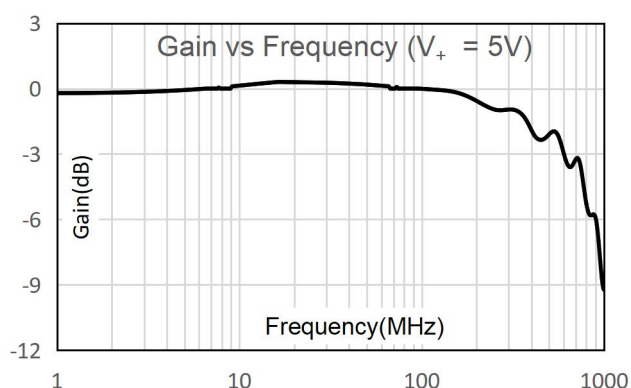


Fig.8-2. Bandwidth vs Frequency at 5V V_+

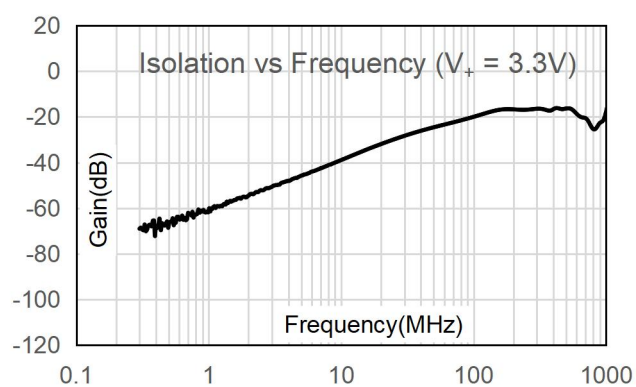


Fig.8-3. Isolation vs Frequency at 3.3V V_+

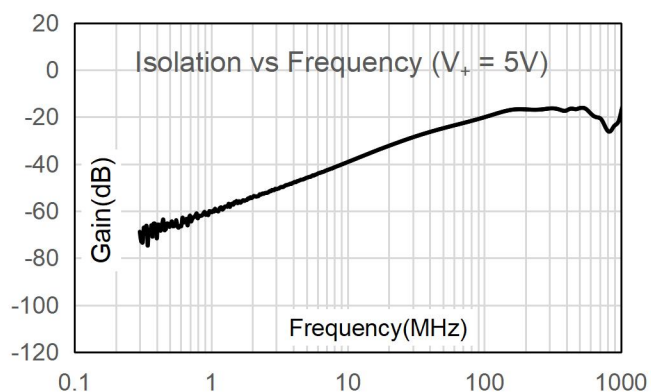


Fig.8-4. Isolation vs Frequency at 5V V_+

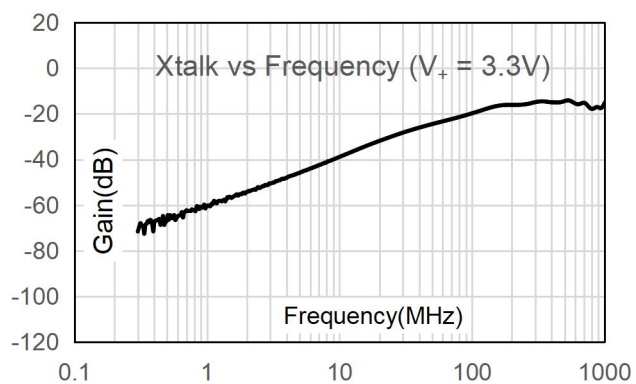


Fig.8-5. Xtalk vs Frequency at 3.3V V_+

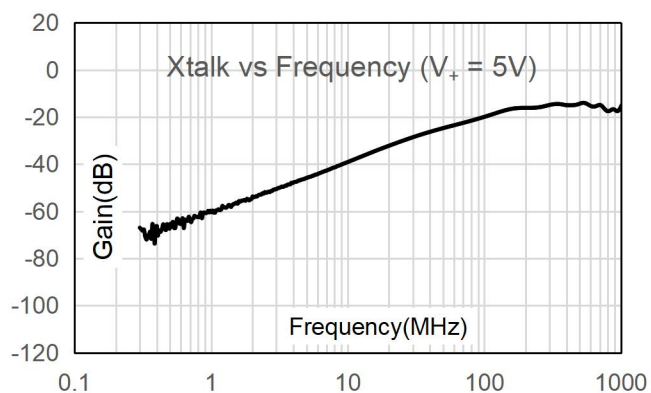


Fig.8-6. Xtalk vs Frequency at 5V V_+

9 Measurement Information

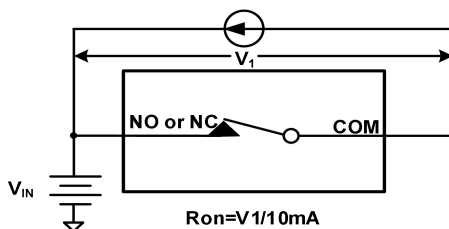


Fig.9-1. On Resistance

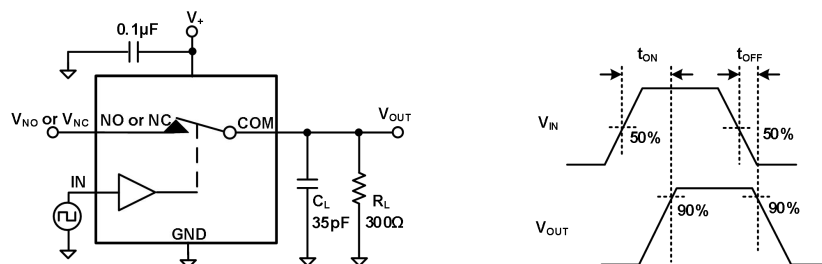


Fig.9-2. Switching Times

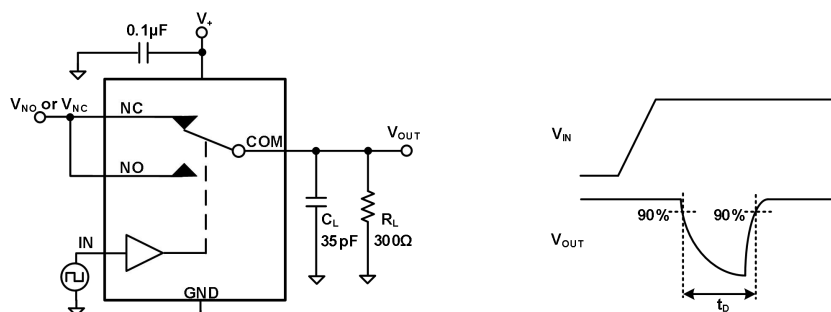


Fig.9-3. Break-Before-Make Time(t_{BBM})

9 Measurement Information (Continued)

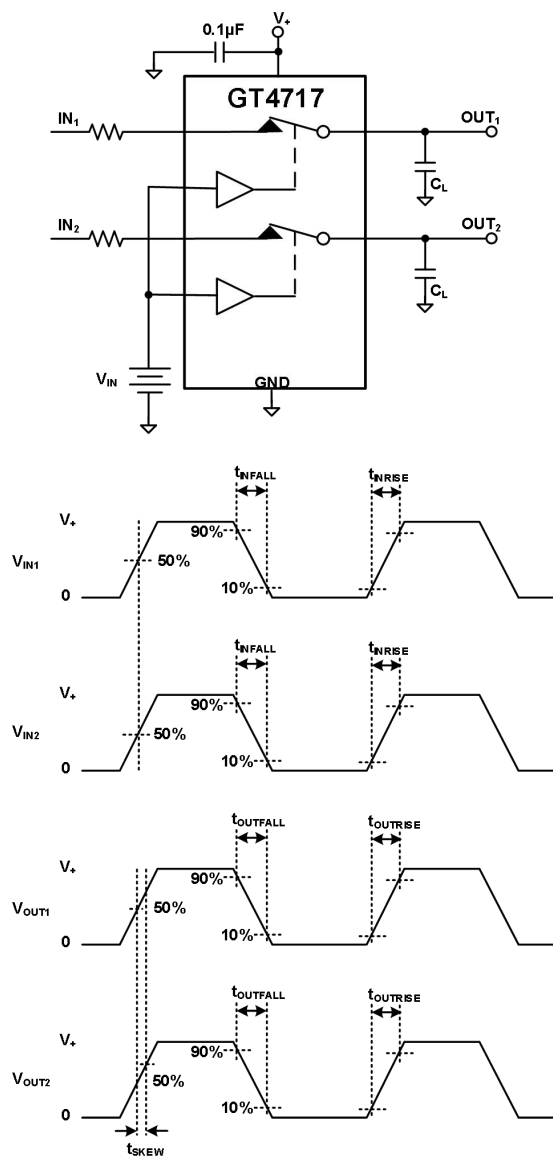


Fig.9-4. Output Signal Skew

9 Measurement Information (Continued)

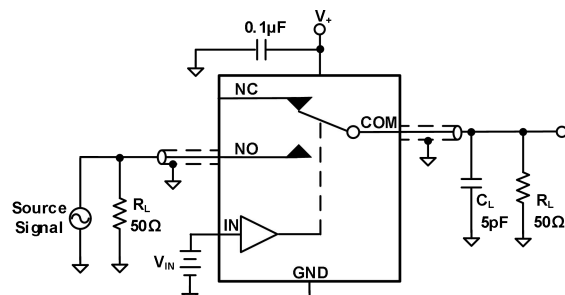


Fig.9-5. OFF Isolation (O_{Iso})

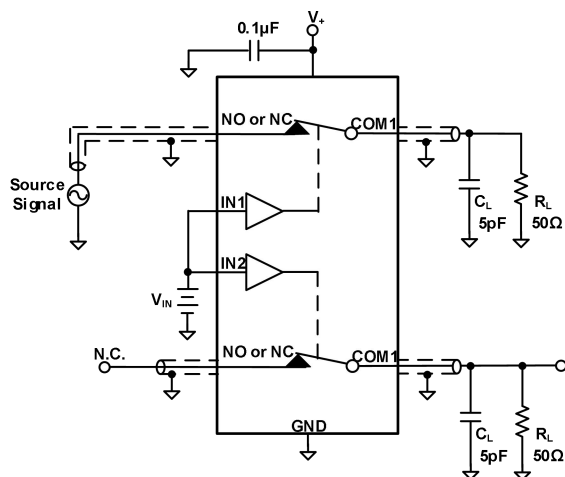


Fig.9-6. Crosstalk (X_{TALK})

9 Measurement Information(Continued)

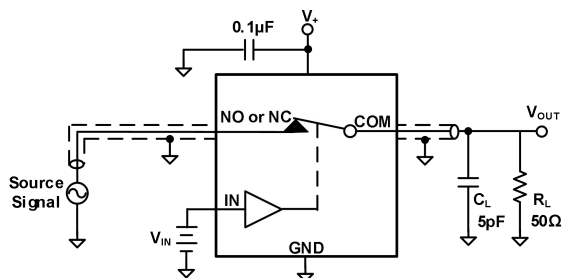


Fig.9-7. Bandwidth

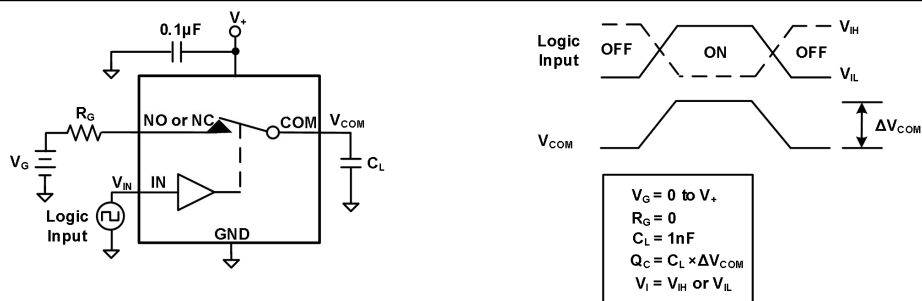


Fig.9-8. Charge Injection Test

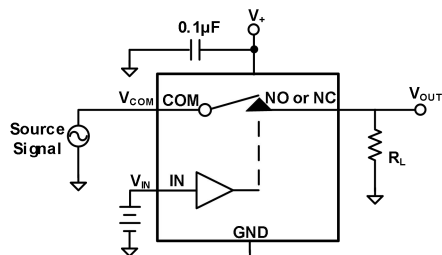
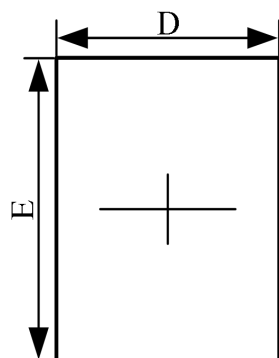


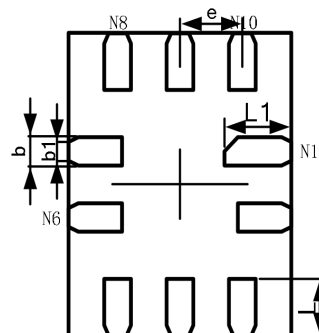
Fig.9-9. Total Harmonic Distortion(THD)

10 Package Outline Dimension

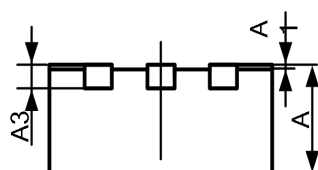
QFN1.4×1.8-10L



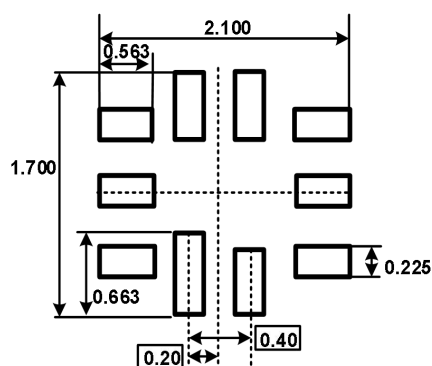
TOP VIEW



BOTTOM VIEW



SIDE VIEW

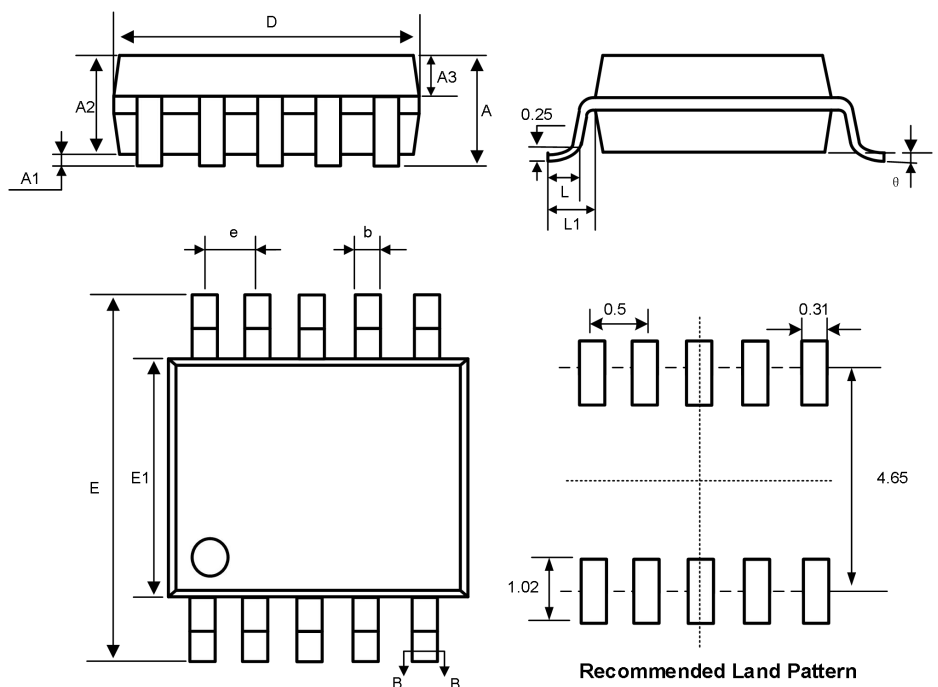


Recommended Land Pattern

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
A3	0.152REF		0.006REF	
D	1.350	1.450	0.053	0.057
E	1.750	1.850	0.069	0.073
D1	—	—	—	—
E1	—	—	—	—
k	—		—	
b	0.150	0.250	0.006	0.010
b1	0.100	0.200	0.004	0.008
e	0.400TYP		0.016TYP	
L	0.350	0.450	0.014	0.018
L1	0.450	0.550	0.018	0.022

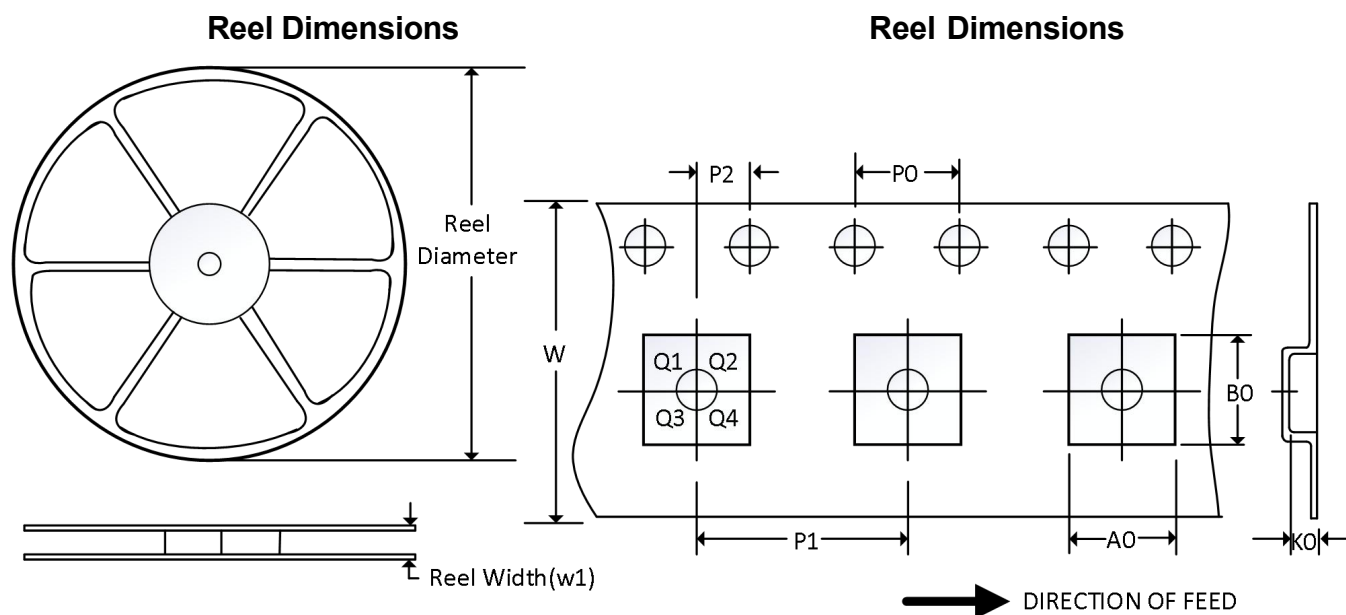
10 Package Outline Dimension(Continued)

MSOP-10



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	—	—	1.10	—	—	0.043
A1	0.05	—	0.15	0.002	—	0.006
A2	1.30	1.40	1.50	0.051	0.055	0.059
A3	0.75	0.85	0.95	0.030	0.033	0.037
D	2.90	3.00	3.10	0.114	0.118	0.122
E	4.70	4.90	5.10	0.185	0.193	0.201
E1	2.90	3.00	3.10	0.114	0.118	0.122
e	0.50BSC			0.02BSC		
L	0.40	—	0.70	0.016	—	0.028
L1	0.95REF			0.037REF		
θ	0	—	8°	0	—	8°

11 Tape and Reel Information



NOTE: The picture is only for reference. Please make the object as the standard.

Key Parameter List of Tape and Reel

Package Type	Reel Diameter	Reel Width(m m)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
QFN1.4×1.8-10L	7"	9	1.6	2	0.85	4.0	4.0	2.0	8.0	Q1
MSOP-10	13"	12.4	5.2	3.3	1.2	4.0	8.0	2.0	12.0	Q1

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.