

GENERAL DESCRIPTION

The MPQ2735 are low voltage, low on-resistance, dual single-pole, double-throw (SPDT) monolithic CMOS analog switches designed for high performance switching of analog signals. Combining low-power, high speed, low on-resistance, and small package size, the MPQ2735 are ideal for portable and battery power applications.

The MPQ2735 have an operation range from 1.65V to 5.5V single supply. The MPQ2735 has two separate control pins and two separate SPDT switches.

The MPQ2735 are guaranteed 1.65V logic compatible for $V+ < 3.3V$, allowing the easy interface with low voltage DSP or MCU control logic and ideal for one cell Li-ion battery direct power.

The switch conducts signals within power rails equally well in both directions when on, and blocks up to the power supply level when off. Break-before-make is guaranteed.

The MPQ2735 are offered in a QFN10 package.

FEATURES

- Guaranteed Industrial/Automotive Temperature
- Low Voltage Operation (1.65V to 5.5V)
- Low On-Resistance - R_{ON} : 0.45Ω at 2.7V
- Fast Switching: T_{ON} = 29ns at 2.7V
- T_{OFF} = 23ns at 2.7V
- Latch-Up Current >300mA (JESD78)
- 2mm x 2mm QFN10 Package
- ESD Human-Body Model ±4000V
- Available in AEC-Q100 Grade 1

APPLICATIONS

- Cellular Phones
- Speaker Headset Switching
- Audio and Video Signal Routing
- PCMCIA Cards
- Battery Powered Systems
- Portable Media Player
- Handheld Test Instruments

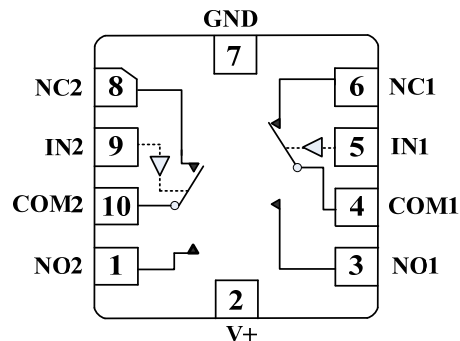
TRUTH TABLE

| | IN1/2 | NC1/2 | NO1/2 |
|---------|-------|-------|-------|
| MPQ2735 | 0 | ON | OFF |
| MPQ2735 | 1 | OFF | ON |

All MPS parts are lead-free, halogen-free, and adhere to the RoHS directive. For MPS green status, please visit the MPS website under Quality Assurance.

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FUNCTIONAL BLOCK DIAGRAM PIN CONFIGURATION



ORDERING INFORMATION

| Part Number* | Package | Top Marking |
|----------------|------------------|-------------|
| MPQ2735GG | QFN-10 (2mmx2mm) | See Below |
| MPQ2735GG-AEC1 | QFN-10 (2mmx2mm) | See Below |

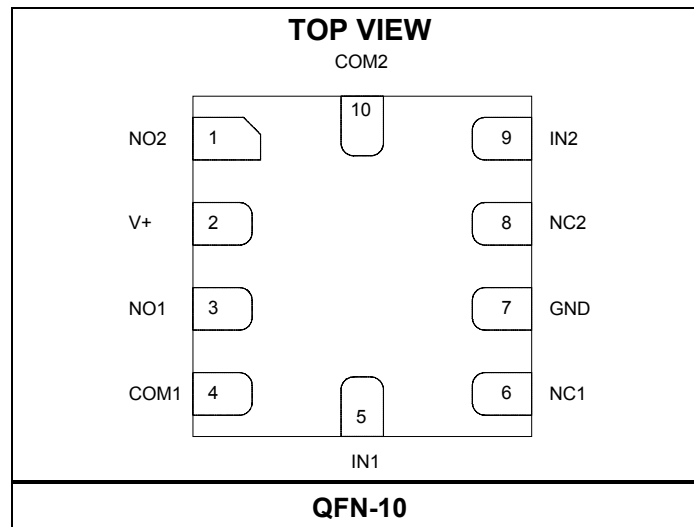
* For Tape & Reel, add suffix -Z (e.g. MPQ2735GG-Z);

TOP MARKING

—
2TY
LLL

2T: product code of MPQ2735GG&MPQ2735GG-AEC1;
 Y: year code;
 LLL: lot number;

PACKAGE REFERENCE



ABSOLUTE MAXIMUM RATINGS

V+ Supply Voltage-0.3V to +6V
IN/COM/NC/NO Voltage ⁽¹⁾ ... -0.3V to V+ + 0.3V
Current
(Any terminal except NO, NC or COM)
..... 30mA
Continuous Current (NO, NC or COM)
..... ±250mA
Peak Current
(Pulsed at 1ms, 10% duty cycle) ±500mA
Storage Temperature..... -65°C to +150°C
Power Dissipation (QFN10 ⁽²⁾ ⁽³⁾) 208mW

Notes:

- 1) Signals on NC, or COM or IN exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.
- 2) Derate 4.0mW/°C above 70°C.
- 3) All leads welded or soldered to PC Board.

ELECTRICAL CHARACTERISTICS

V₊=3V, ±10%, V_{IN}=0.4 or 1.65V, T_J = -40°C to +125°C, unless otherwise noted. Typical values are at T_J = 25°C.

| Parameter | Symbol | Condition | Min | Typ | Max | Units |
|-------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------|----------------------------------|-------|------|-------|
| Analog Switch | | | | | | |
| Analog Signal Range | V _{analog} | Γ _{DS(on)} , T _A = -40°C to +125°C | 0 | | V+ | V |
| On-Resistance | Γ _{DS(on)} | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =0.5V | T _A = +25°C | 0.28 | 0.45 | Ω |
| | | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =1.5V | | | | |
| | | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =0.5V | T _A = -40°C to +125°C | 0.30 | | |
| | | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =1.5V | | | | |
| | | V ₊ =5.5V, I _{NO/NC} =100mA, V _{COM} =0.9V | T _A = +25°C | 0.20 | 0.30 | |
| | | V ₊ =5.5V, I _{NO/NC} =100mA, V _{COM} =2.5V | | | | |
| | | V ₊ =5.5V, I _{NO/NC} =100mA, V _{COM} =0.9V | T _A = -40°C to +125°C | 0.25 | | |
| V ₊ =5.5V, I _{NO/NC} =100mA, V _{COM} =2.5V | | | | | | |
| r _{ON} Match | Δr _{on} | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =0.5V/1.5V | T _A = +25°C | 0.01 | 0.02 | |
| | | V ₊ =5.5V, I _{NO/NC} =100mA, V _{COM} =0.9V/2.5V | | | | |
| r _{ON} Flatness | r _{ON} Flatness | V ₊ =2.7V, I _{NO/NC} =100mA, V _{COM} =0.5V/1.5V | | | 0.15 | |
| Switch Off Leakage Current | I _{NO/NC(off)} | V ₊ =5.5V, V _{NO/NC} =0.3V/4.0V, V _{COM} =4.0V/0.3V | T _A = +25°C | -40 | 40 | nA |
| | | | T _A = -40°C to +125°C | -1000 | 1000 | |
| | T _A = +25°C | | -40 | 40 | | |
| | T _A = -40°C to +125°C | | -1000 | 1000 | | |
| | I _{COM(off)} | | | | | |
| Channel-On Leakage Current | I _{COM(on)} | V ₊ =5.5V, V _{NO/NC} =V _{COM} =4.0V/0.3V | T _A = +25°C | -40 | 40 | |
| | | | T _A = -40°C to +125°C | -1000 | 1000 | |
| Digital Control | | | | | | |
| Input High Voltage | V _{INH} | T _A = -40°C to +125°C | 1.65 | | | V |
| Input Low Voltage | V _{INL} | | | | 0.4 | |
| Input Capacitance | C _{IN} | | 6 | | | pF |
| Input Current | I _{INL} or I _{INH} | | V _{IN} =0 | -1 | | 1 |
| | | V _{IN} = V+ | | 5.5 | | |

ELECTRICAL CHARACTERISTICS (continued)

V+=3V, ±10%, V_{IN}=0.4 or 1.65V, T_J = -40°C to +125°C, unless otherwise noted. Typical values are at T_J = 25°C.

| Parameter | Symbol | Condition | Min | Typ | Max | Units |
|---------------------------------------|----------------------|--------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------|-----|-------|
| Dynamic Characteristics | | | | | | |
| Break-Before-Make Time ⁽⁴⁾ | t _{BBM} | V+=3.6V, V _{NO} /V _{NC} =1.5V, R _L =50Ω, C _L =35pF | T _A = +25°C | 10 | | ns |
| Turn-On Time ⁽⁴⁾ | t _{ON} | | | T _A = -40°C to +125°C | 40 | |
| Turn-Off Time ⁽⁴⁾ | t _{OFF} | | T _A = +25°C | 20 | | |
| | | | T _A = -40°C to +125°C | 35 | | |
| Off-Isolation ⁽⁴⁾ | OIRR | R _L =50Ω, C _L =5pF, f=100kHz | | -70 | | dB |
| Crosstalk ⁽⁴⁾ | XTALK | | | -70 | | dB |
| 3dB Bandwidth ⁽⁴⁾ | | | | R _L =50Ω, C _L =5pF | 50 | |
| NO, NC Off Capacitance ⁽⁴⁾ | C _{NO(off)} | V _{IN} =0V, or V+, f=1MHz | T _A = +25°C | 55 | | pF |
| | C _{NC(off)} | | | 55 | | |
| Channel On Capacitance ⁽⁴⁾ | C _{NO(on)} | | | 130 | | |
| | C _{NC(on)} | | | 130 | | |
| Power Supply | | | | | | |
| Power Supply Range | V+ | | 1.65 | | 5.5 | V |
| Power Supply Current | I+ | V _{IN} =0 or V+ | T _A = 25°C | -1 | 1 | μA |

Note:

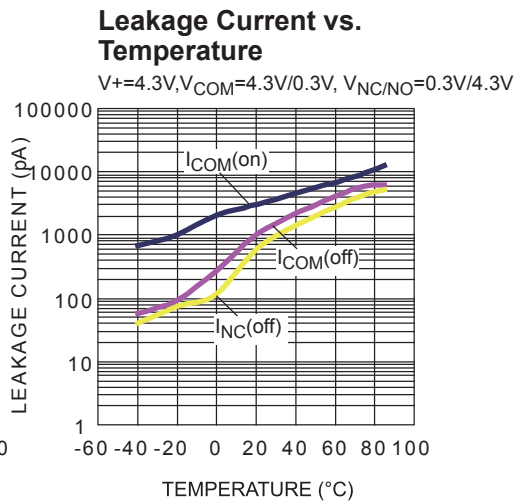
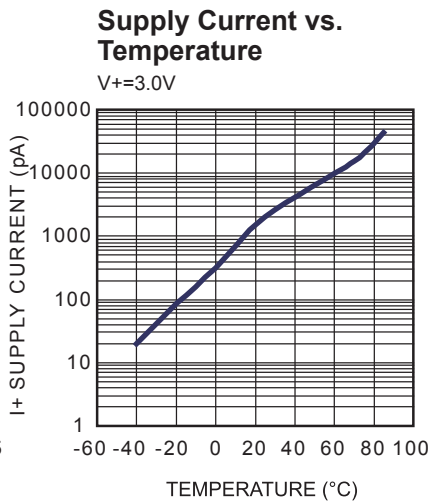
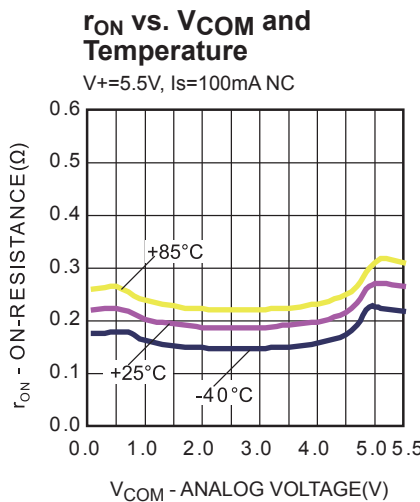
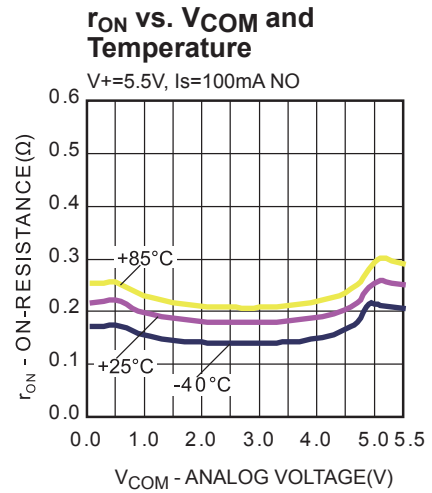
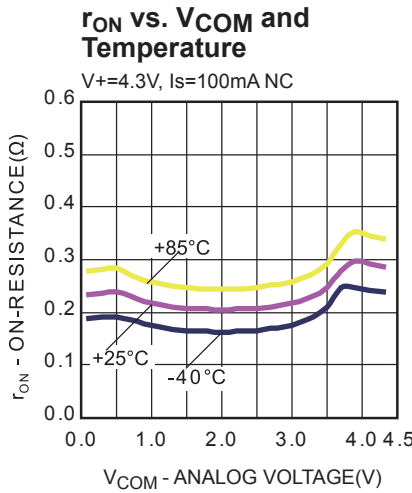
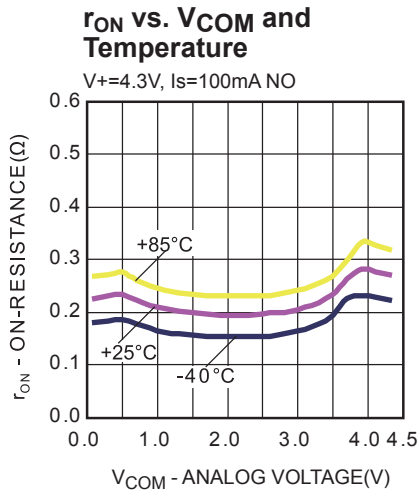
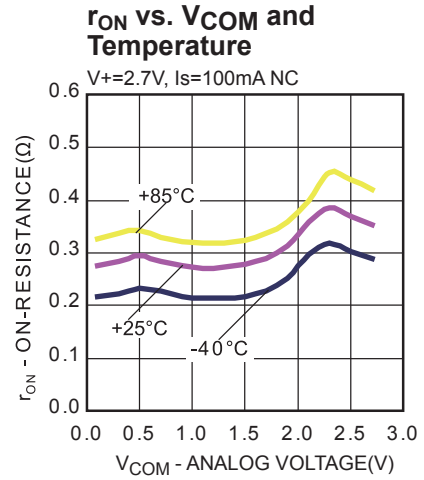
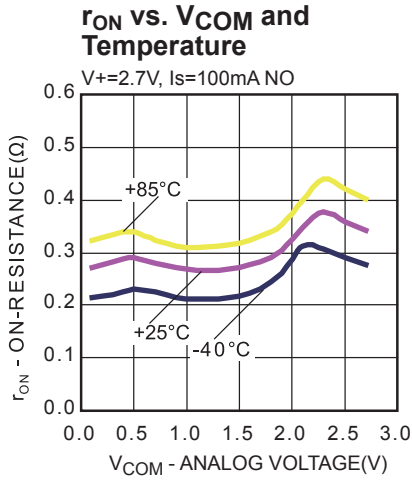
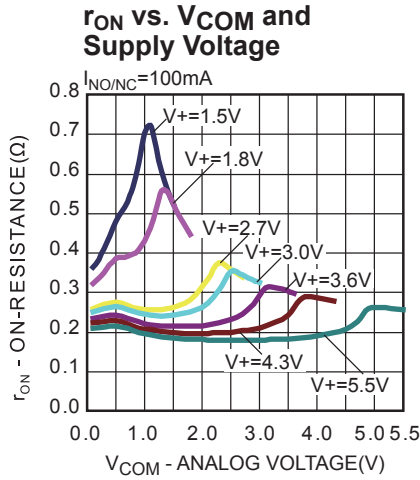
- 4) Guarantee by design, not subjected to production test.

PIN FUNCTIONS

| Pin # | Name | Description |
|-------|------|-----------------------------------------------------------------------|
| 1 | NO2 | Normally open I/O port of switch2 |
| 2 | V+ | Supply Voltage |
| 3 | NO1 | Normally open I/O port of switch1 |
| 4 | COM1 | Common I/O port for NC and NO channels of switch1 |
| 5 | IN1 | Channel select signal for switch1. IN1 high, NO1 channel is selected. |
| 6 | NC1 | Normally closed I/O port of switch1 |
| 7 | GND | Ground |
| 8 | NC2 | Normally closed I/O port of switch2 |
| 9 | IN2 | Channel select signal for switch2. IN2 high, NO2 channel is selected. |
| 10 | COM2 | Common I/O port for NC and NO channels of switch2 |

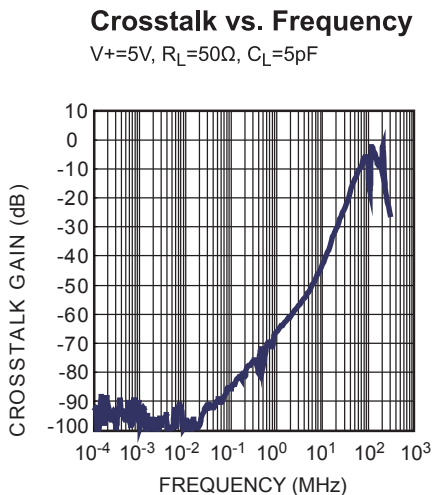
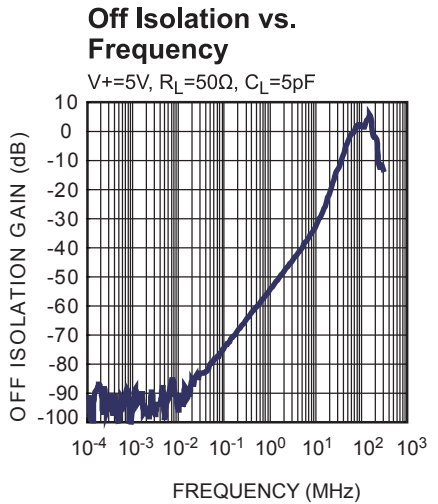
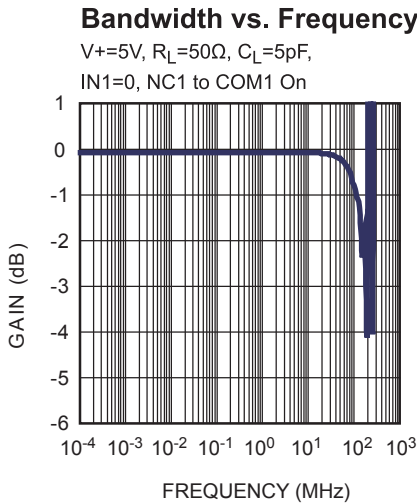
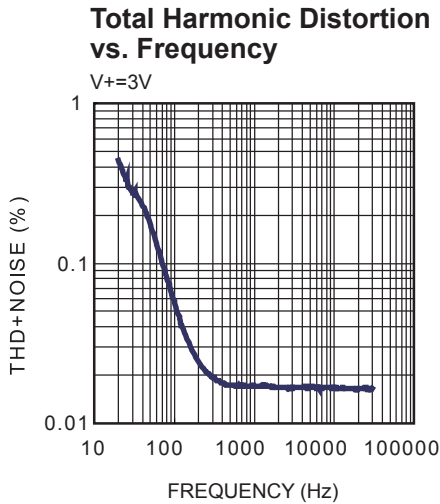
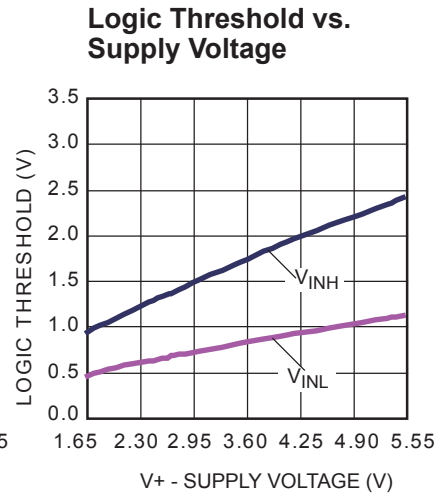
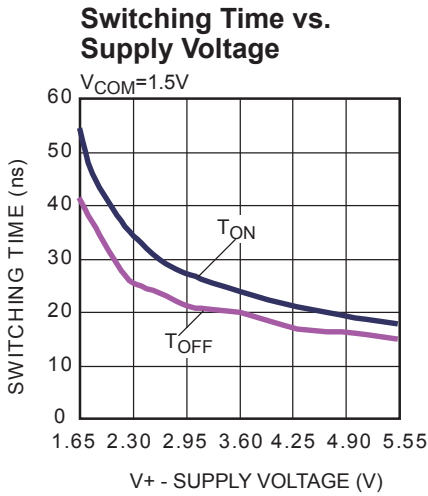
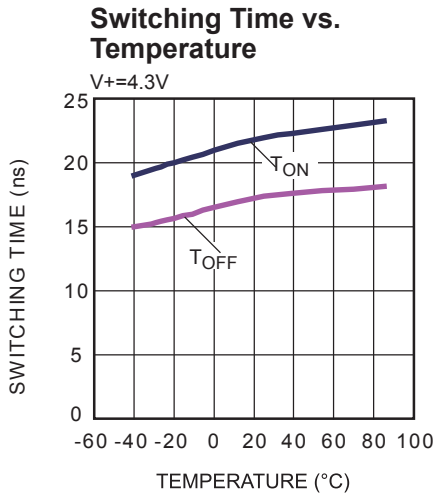
TYPICAL PERFORMANCE CHARACTERISTICS

T_A = +25°C, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_A = +25°C, unless otherwise noted.



TEST CIRCUITS

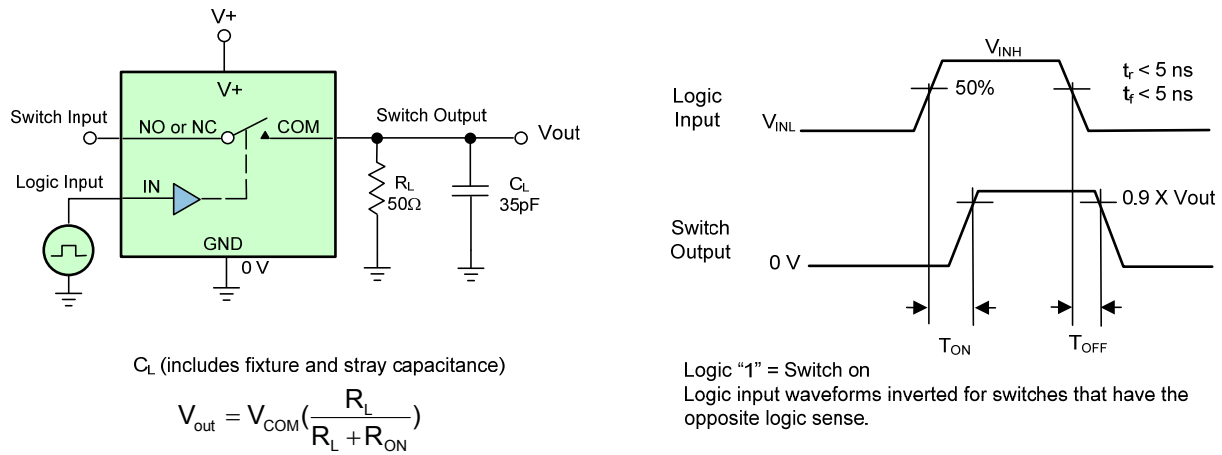


Figure 1 — Switching Time

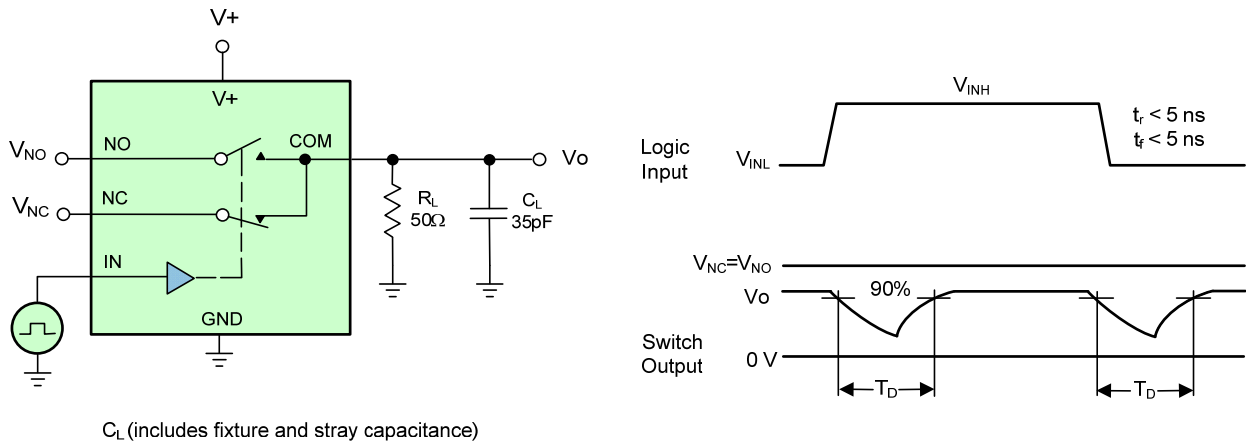


Figure 2 — Break-Before-Make Interval

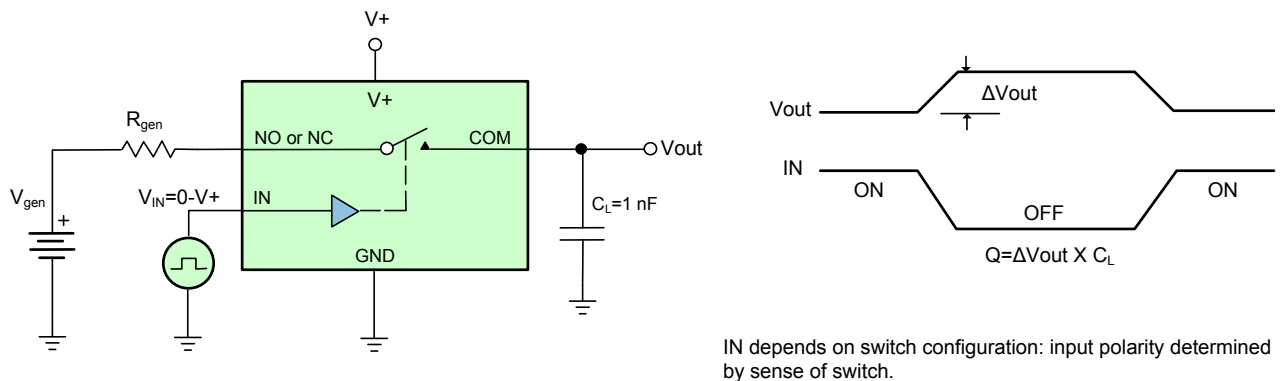
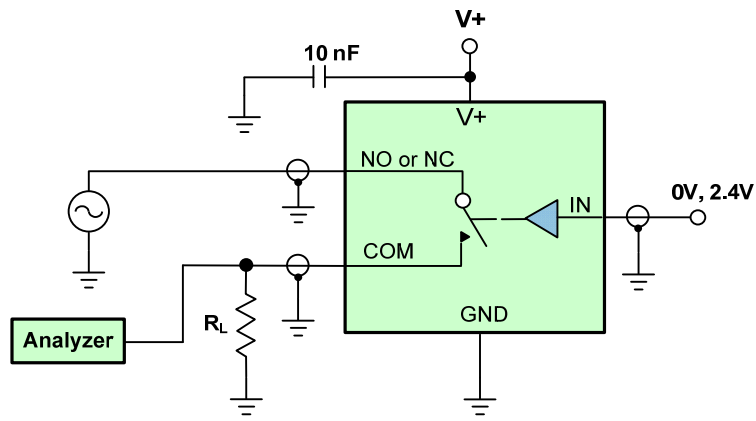


Figure 3 — Charge Injection



$$\text{Off Isolation} = 20 \log \frac{V_{\text{COM}}}{V_{\text{NO/NC}}}$$

Figure 4 — Off-Isolation

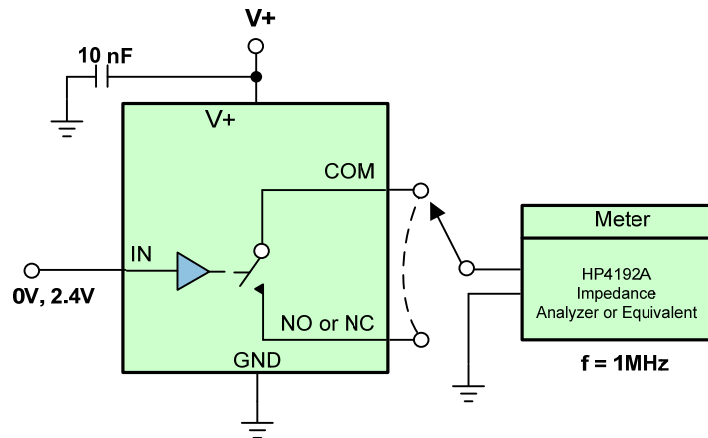
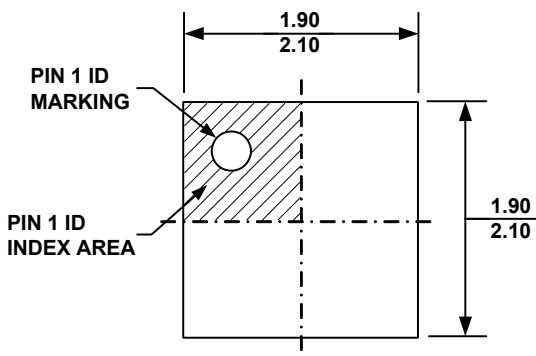


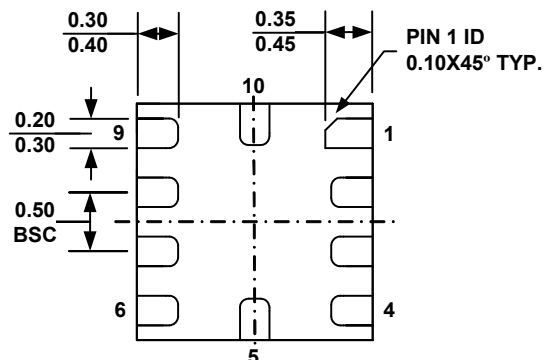
Figure 5 — Channel Off/On Capacitance

PACKAGE INFORMATION

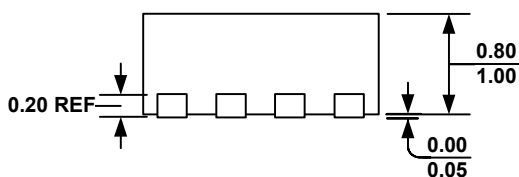
QFN-10 (2mmX2mm)



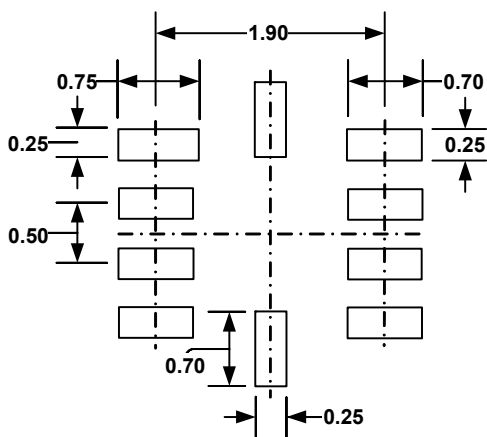
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN

NOTE:

- 1) ALL DIMENSIONS ARE IN MILLIMETERS.
- 2) EXPOSED PADDLE SIZE DOES NOT INCLUDE MOLD FLASH.
- 3) LEAD COPLANARITY SHALL BE 0.10 MILLIMETER MAX.
- 4) JEDEC REFERENCE IS MO-220, VARIATION VCCD.
- 5) DRAWING IS NOT TO SCALE.

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