



NEC's 1W L, S-BAND SPDT SWITCH

UPG2030TB

FEATURES

- **SWITCH CONTROL VOLTAGE:**
 $V_{cont} (H) = 2.7 \text{ to } 3.0 \text{ V (} 2.8 \text{ V TYP.)}$
 $V_{cont} (L) = -0.2 \text{ to } +0.2 \text{ V (} 0 \text{ V TYP.)}$
- **LOW INSERTION LOSS:**
 $LINS1 = 0.25 \text{ dB TYP. @ } f = 0.5 \text{ to } 1.0 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
 $LINS2 = 0.30 \text{ dB TYP. @ } f = 1.0 \text{ to } 2.0 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
 $LINS3 = 0.35 \text{ dB TYP. @ } f = 2.0 \text{ to } 2.5 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
- **HIGH ISOLATION:**
 $ISL1 = 27 \text{ dB TYP. @ } f = 0.5 \text{ to } 2.0 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
 $ISL2 = 24 \text{ dB TYP. @ } f = 2.0 \text{ to } 2.5 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
- **POWER HANDLING:**
 $P_{in} (0.1 \text{ dB}) = +27.0 \text{ dBm TYP. @ } f = 2.0 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
 $P_{in} (1 \text{ dB}) = +30.0 \text{ dBm TYP. @ } f = 2.0 \text{ GHz, } V_{cont} = 2.8 \text{ V/0 V}$
(Reference value)
- **HIGH-DENSITY SURFACE MOUNTING:**
6-pin super minimold package (2.0 × 1.25 × 0.9 mm)

DESCRIPTION

NEC's UPG2030TB is a GaAs MMIC L, S-band SPDT (Single Pole Double Throw) switch for mobile phone and L, S-band applications.

This device can operate from 0.5 to 2.5 GHz, with low insertion loss and high isolation.

This device is housed in a 6-pin super minimold package, suitable for high-density surface mounting.

APPLICATIONS

- L, S-band digital cellular or cordless handsets
- PCS, W-LAN, WLL and Bluetooth™ etc.
- Short Range Wireless

ORDERING INFORMATION

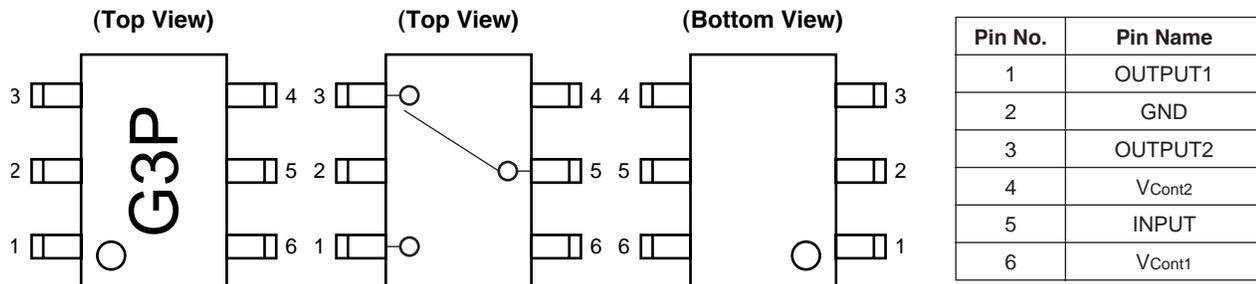
| Part Number | Package | Marking | Supplying Form |
|--------------|----------------------|---------|---|
| μPG2030TB-E3 | 6-pin super minimold | G3P | <ul style="list-style-type: none">• Embossed tape 8 mm wide• Pin 1, 2, 3 face the perforation side of the tape• Qty 3 kpcs/reel |

Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: UPG2030TB

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



TRUTH TABLE

| Vcont1 | Vcont2 | INPUT-OUTPUT1 | INPUT-OUTPUT2 |
|--------|--------|---------------|---------------|
| Low | High | ON | OFF |
| High | Low | OFF | ON |

ABSOLUTE MAXIMUM RATINGS (TA = 25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|------------------|-------------|------|
| Switch Control Voltage | Vcont | 6.0 | V |
| Input Power | P _{in} | +33 | dBm |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

RECOMMENDED OPERATING RANGE (TA = 25°C, unless otherwise specified)

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|----------------------------|-----------------------|------|------|------|------|
| Switch Control Voltage (H) | V _{cont (H)} | 2.7 | 2.8 | 3.0 | V |
| Switch Control Voltage (L) | V _{cont (L)} | -0.2 | 0 | 0.2 | V |

ELECTRICAL CHARACTERISTICS

($T_A = +25^\circ\text{C}$, $V_{\text{cont}} = 2.8 \text{ V/0 V}$, DC blocking capacitors = 56 pF, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|-------------------------|--------------------------|---------------------------------------|-------|-------|------|---------------|
| Insertion Loss 1 | L_{INS1} | $f = 0.5 \text{ to } 1.0 \text{ GHz}$ | - | 0.25 | 0.45 | dB |
| Insertion Loss 2 | L_{INS2} | $f = 1.0 \text{ to } 2.0 \text{ GHz}$ | - | 0.30 | 0.50 | dB |
| Insertion Loss 3 | L_{INS3} | $f = 2.0 \text{ to } 2.5 \text{ GHz}$ | - | 0.35 | 0.55 | dB |
| Isolation 1 | ISL_1 | $f = 0.5 \text{ to } 2.0 \text{ GHz}$ | 23 | 27 | - | dB |
| Isolation 2 | ISL_2 | $f = 2.0 \text{ to } 2.5 \text{ GHz}$ | 20 | 24 | - | dB |
| Input Return Loss | RL_{in} | $f = 0.5 \text{ to } 2.5 \text{ GHz}$ | 15 | 20 | - | dB |
| Output Return Loss | RL_{out} | $f = 0.5 \text{ to } 2.5 \text{ GHz}$ | 15 | 20 | - | dB |
| 0.1 dB Gain Compression | $P_{\text{in (0.1 dB)}}$ | $f = 2.0 \text{ GHz}$ | +25.5 | +27.0 | - | dBm |
| Input Power Note | | $f = 2.5 \text{ GHz}$ | +25.5 | +27.0 | - | dBm |
| Switch Control Current | I_{cont} | No signal | - | 4 | 20 | μA |
| Switch Control Speed | t_{sw} | | - | 50 | 500 | ns |

Note $P_{\text{in (0.1 dB)}}$ is the measured input power level when the insertion loss increases 0.1 dB more than that of linear range.

STANDARD CHARACTERISTICS FOR REFERENCE

($T_A = +25^\circ\text{C}$, $V_{\text{cont}} = 3.0 \text{ V/0 V}$, DC blocking capacitors = 51 pF, unless otherwise specified)

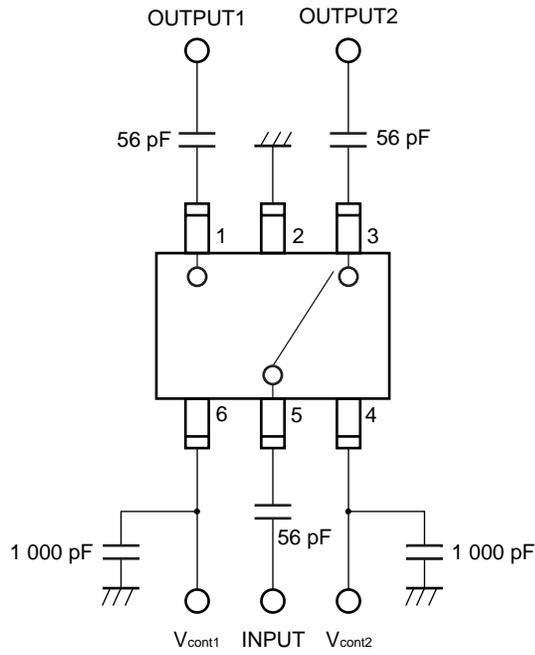
| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------------|-----------------------|------|-------|------|------|
| 1 dB Gain Compression Input Power Note | $P_{\text{in (1 dB)}}$ | $f = 2.0 \text{ GHz}$ | - | +30.0 | - | dBm |

Note $P_{\text{in (1 dB)}}$ is the measured input power level when the insertion loss increases 1 dB more than that of linear range.

Caution It is necessary to use DC blocking capacitors with the device.

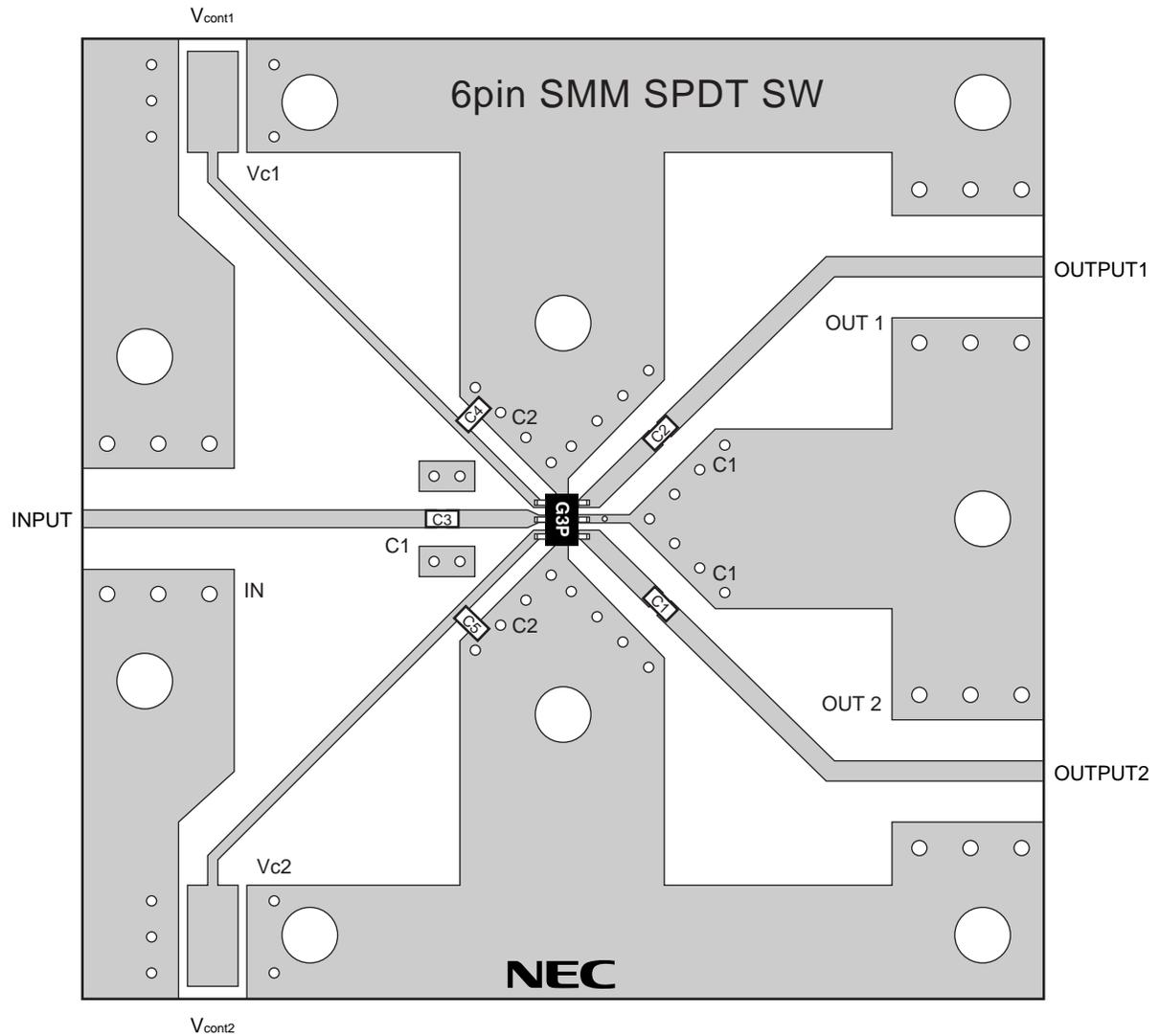
The value of DC blocking capacitors should be chosen to accommodate the frequency of operation, bandwidth, switching speed and the condition with actual board of your system. The range of recommended DC blocking capacitor value is less than 100 pF.

EVALUATION CIRCUIT ($V_{cont} = 2.8 \text{ V/0 V}$, DC blocking capacitors = 56 pF)



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

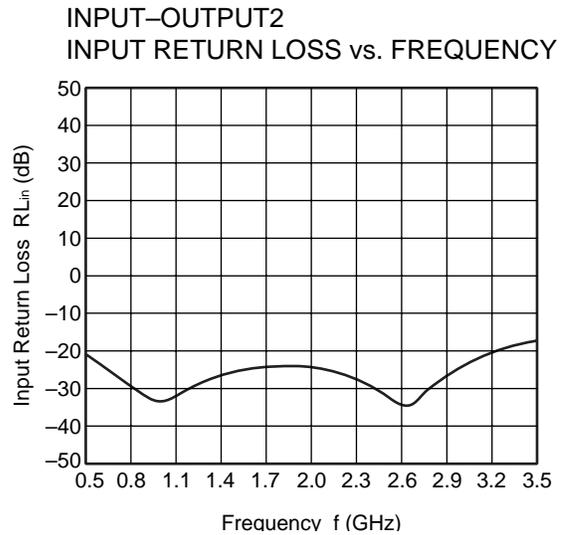
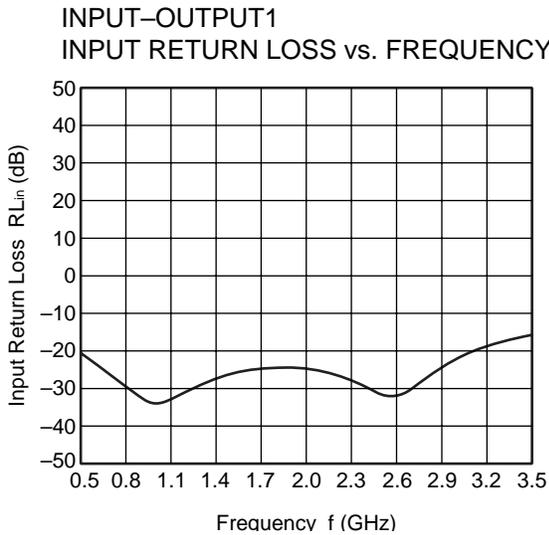
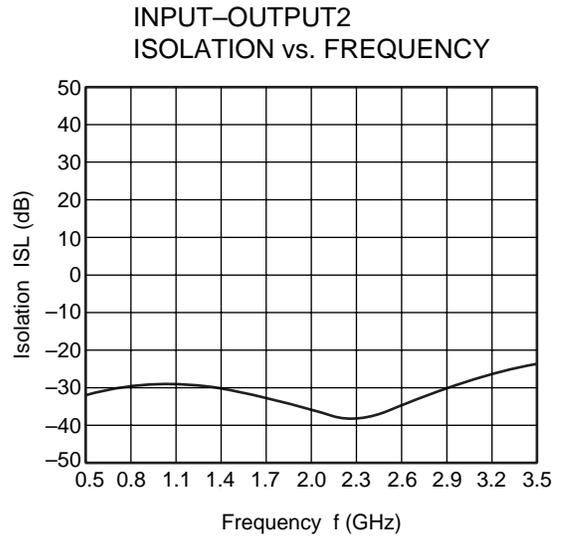
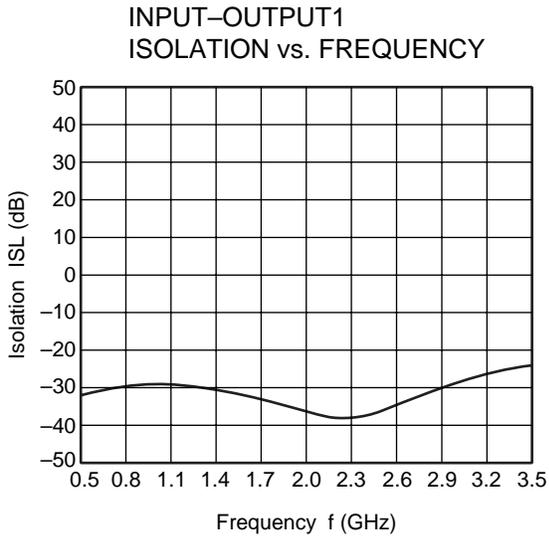
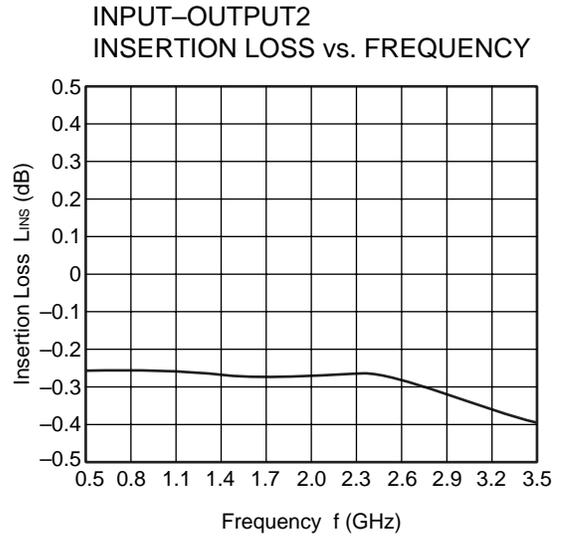
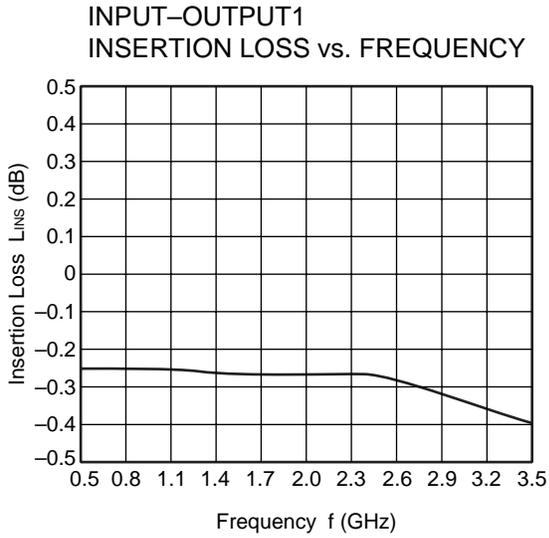


USING THE NEC EVALUATION BOARD

| Symbol | Values |
|------------|----------|
| C1, C2, C3 | 56 pF |
| C4, C5 | 1 000 pF |

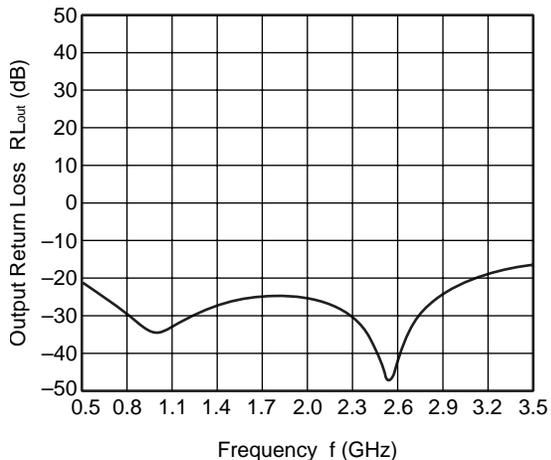
TYPICAL CHARACTERISTICS

(TA = 25°C, Vcont = 2.8 V/0 V, DC blocking capacitors = 56 pF, unless otherwise specified)

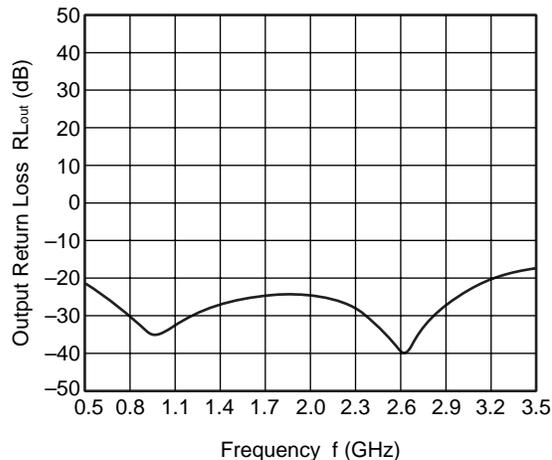


Remark The graphs indicate nominal characteristics.

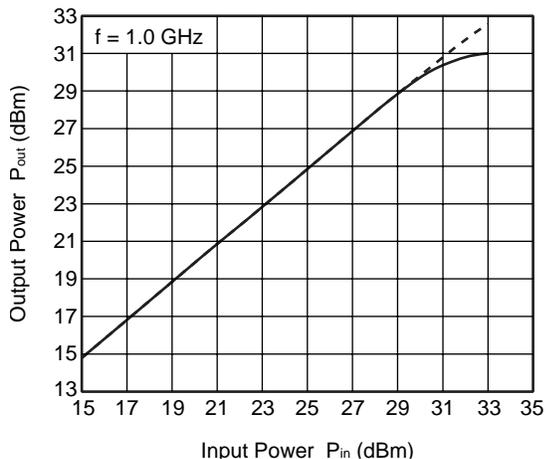
INPUT-OUTPUT1
OUTPUT RETURN LOSS vs. FREQUENCY



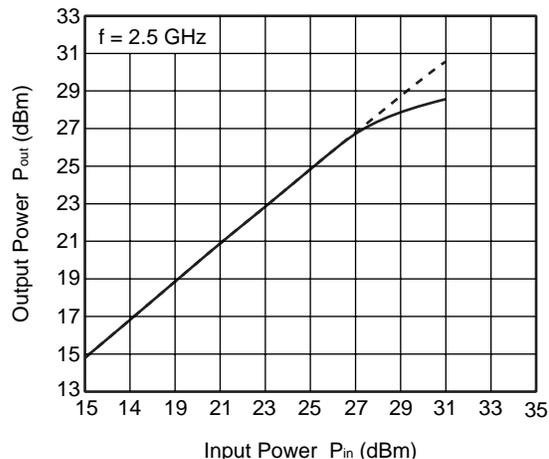
INPUT-OUTPUT2
OUTPUT RETURN LOSS vs. FREQUENCY



OUTPUT POWER vs. INPUT POWER



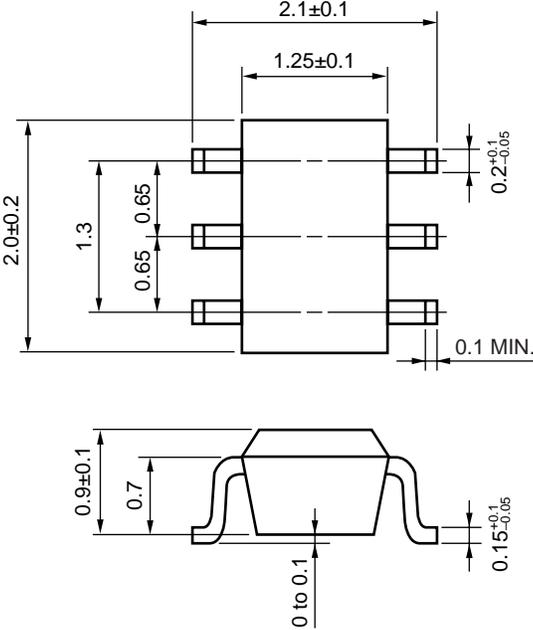
OUTPUT POWER vs. INPUT POWER



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN SUPER MINIMOLD (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| VPS | Peak temperature (package surface temperature) : 215°C or below Time at temperature of 200°C or higher : 25 to 40 seconds Preheating time at 120 to 150°C : 30 to 60 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | VP215 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (pin temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350 |

Caution Do not use different soldering methods together (except for partial heating).

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • www.cel.com

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02/18/2004