

# PIEZOELECTRIC DEVICES

## F5CB Series SAW Filters for Mobile Communications

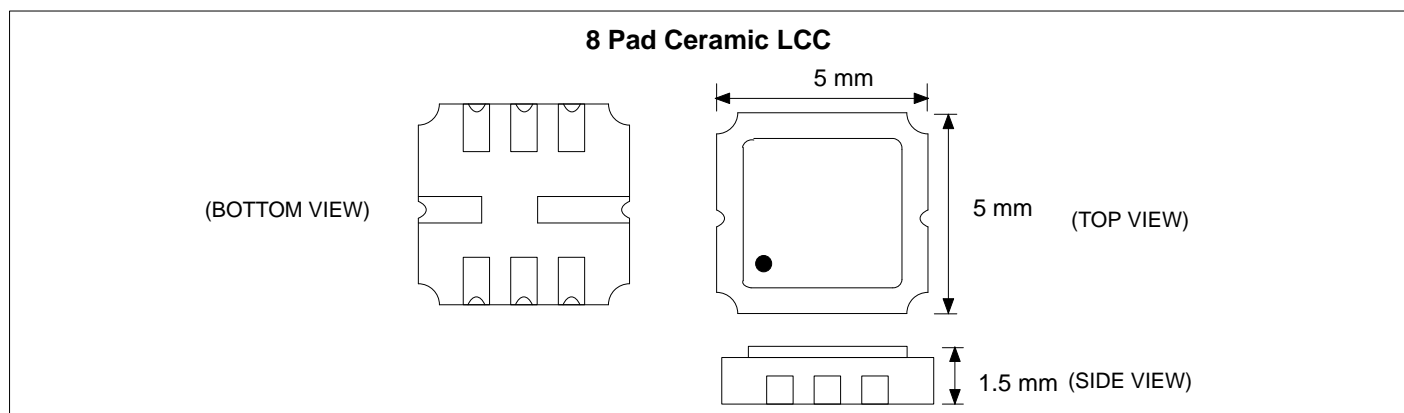
The F5CB series are wide bandpass Surface Acoustic Wave (SAW) filters for use in the 700 MHz to 1 GHz range. The F5CB series uses a single lithium tantalate piezoelectric crystal (Li-TaO<sub>3</sub>) which has a high electromechanical coupling coefficient. The Li-TaO<sub>3</sub> also provides wide bandwidths and exceptional stability. Fujitsu's exclusive mounting technology makes the F5CB series very compact and surface mountable. The F5CB is suitable for use in handheld cellular phones.

- Considerably smaller and lighter than a ceramic filter
- Surface mount package (SMT)
- High stopband attenuation types available
- Wide variety of bandwidths for world-wide systems
- Low insertion loss
- High power rating: 0.2 W guaranteed
- External impedance matching
- Package : 8-pad ceramic LCC (5.0 mm x 5.0 mm x 1.5 mm)

## Product Line-up

| Part Number          | System   | Use | Center Frequency (MHz) | Bandwidth (MHz) | Comment                   |
|----------------------|----------|-----|------------------------|-----------------|---------------------------|
| FAR-F5CB-836M50-G201 | AMPS/ADC | Tx  | 836.5                  | 25              |                           |
| FAR-F5CB-881M50-G201 | AMPS/ADC | Rx  | 881.5                  | 25              |                           |
| FAR-F5CB-881M50-G211 | AMPS/ADC | Rx  | 881.5                  | 25              | High stopband attenuation |
| FAR-F5CB-888M50-G201 | ETACS    | Tx  | 888.5                  | 33              |                           |
| FAR-F5CB-933M50-G202 | ETACS    | Rx  | 933.5                  | 33              |                           |
| FAR-F5CB-933M50-G212 | ETACS    | Rx  | 933.5                  | 33              | High stopband attenuation |
| FAR-F5CB-902M50-G201 | NMT/GSM  | Tx  | 902.5                  | 25              |                           |
| FAR-F5CB-947M50-G201 | NMT/GSM  | Rx  | 947.5                  | 25              |                           |
| FAR-F5CB-947M50-G211 | NMT/GSM  | Rx  | 947.5                  | 25              | High stopband attenuation |
| FAR-F5CB-911M50-G201 | NTACS    | Tx  | 911.5                  | 27              |                           |
| FAR-F5CB-933M50-G201 | NTT      | Tx  | 933.5                  | 17              |                           |
| FAR-F5CB-878M50-G201 | NTT      | Rx  | 878.5                  | 17              |                           |

## Package



# PIEZOELECTRIC DEVICES

## F5CC (L2) Series SAW Filters – 50Ω Matched for Mobile Communication

The F5CC series are wide bandpass Surface Acoustic Wave (SAW) filters for use in the 700 MHz to 1 GHz range. The F5CC series uses a single lithium tantalate piezoelectric crystal (Li-TaO<sub>3</sub>) which has a high electromechanical coupling coefficient. The LiTaO<sub>3</sub> also provides wide bandwidths and exceptional stability. The F5CC(L2) series is ultra compact and surface mountable which makes it suitable for use in hand held cellular phones

- Ultra compact, light weight
- No external matching circuitry necessary
- Lower insertion loss
- SMT Package
- Wide variety of standard products for all the world's major telecommunications systems
- High power rating: 0.2 W
- Package : 6-pad ceramic LCC (3.8 mm x 3.8 mm x 1.5 mm)

### Product Line-up – Standard Version

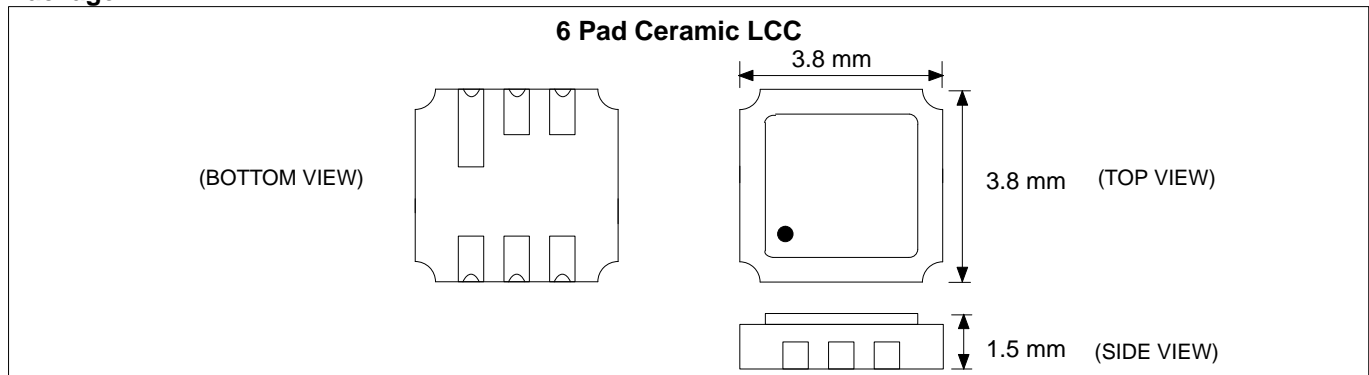
| Part Number          | System        | Part Symbol | Center Frequency (MHz) | Bandwidth (MHz) |
|----------------------|---------------|-------------|------------------------|-----------------|
| FAR-F5CC-836M50-L2AA | AMPS/ADC (Tx) | AA          | 836.5                  | 25              |
| FAR-F5CC-881M50-L2AB | AMPS/ADC (Rx) | AB          | 881.5                  | 25              |
| FAR-F5CC-933M50-L2BA | NTT (Tx)      | BA          | 933.5                  | 17              |
| FAR-F5CC-878M50-L2BB | NTT (Rx)      | BB          | 878.5                  | 17              |
| FAR-F5CC-888M50-L2CA | ETACS (TX)    | CA          | 888.5                  | 33              |
| FAR-F5CC-933M50-L2CB | ETACS (RX)    | CB          | 933.5                  | 33              |
| FAR-F5CC-911M50-L2DA | NTACS (Tx)    | DA          | 911.5                  | 27              |
| FAR-F5CC-856M50-L2DB | NTACS (Rx)    | DB          | 856.5                  | 27              |
| FAR-F5CC-902M50-L2EA | NMT/GSM (Tx)  | EA          | 902.5                  | 25              |
| FAR-F5CC-947M50-L2EB | NMT/GSM (Rx)  | EB          | 947.5                  | 25              |
| FAR-F5CC-897M50-L2KA | E-GSM (Tx)    | KA          | 897.5                  | 35              |
| FAR-F5CC-942M50-L2KB | E-GSM (Rx)    | KB          | 942.5                  | 35              |
| FAR-F5CC-950M00-L2FA | PDC (Tx)      | FA          | 950.0                  | 20              |
| FAR-F5CC-820M00-L2FB | PDC (Rx)      | FB          | 820.0                  | 20              |
| FAR-F5CC-915M00-L2JA | ISM/USA       | JA          | 915.0                  | 26              |
| FAR-F5CC-935M00-L2LA | 2-Way Pager   | LA          | 935.0                  | 12              |

### Product Line-up – High Attenuation Version

| Part Number          | System        | Part Symbol | Center Frequency (MHz) | Bandwidth (MHz) |
|----------------------|---------------|-------------|------------------------|-----------------|
| FAR-F5CC-836M50-L2AZ | AMPS/ADC (Tx) | AZ          | 836.5                  | 25              |
| FAR-F5CC-881M50-L2AY | AMPS/ADC (Rx) | AY          | 881.5                  | 25              |
| FAR-F5CC-902M50-L2EZ | NMT/GSM (Tx)  | EZ          | 902.5                  | 25              |
| FAR-F5CC-947M50-L2EY | NMT/GSM (Rx)  | EY          | 947.5                  | 25              |
| FAR-F5CC-947M50-L2EX | NMT/GSM (Rx)  | EX          | 947.5                  | 25              |
| FAR-F5CC-942M50-L2KY | E-GSM (Rx)    | KY          | 942.5                  | 35              |
| FAR-F5CC-915M00-L2JZ | ISM/USA       | JZ          | 915.0                  | 26              |

# PIEZOELECTRIC DEVICES

## Package



# PIEZOELECTRIC DEVICES

## F6Cx (L2) Series SAW Filters – 50Ω Matched for Mobile Communication

The F6Cx series are wide bandpass Surface Acoustic Wave (SAW) filters for use in the 1 GHz to 2.5 GHz range. The F6Cx series uses a single lithium tantalate piezoelectric crystal (Li-TaO<sub>3</sub>) which has a high electromechanical coupling coefficient. The Li-TaO<sub>3</sub> also provides wide bandwidths and exceptional stability. The F6Cx(L2) series is ultra compact and surface mountable which makes it suitable for use in hand held cellular and PCS phones. Several new standard devices for PCS/PCN Systems have recently been added to the F6Cx Series SAW Filters.

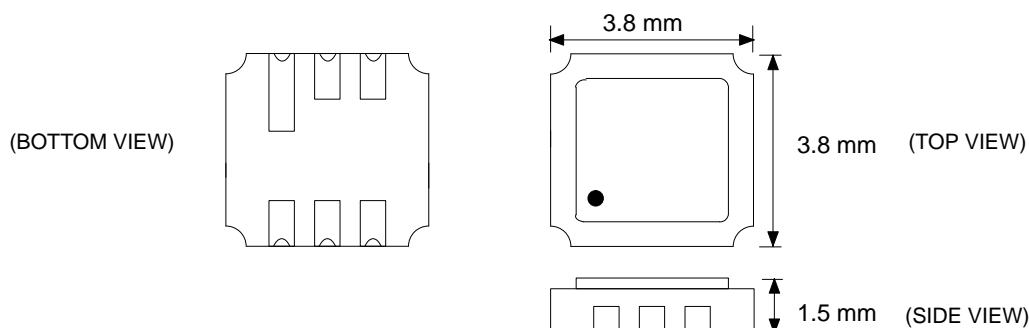
- Ultra compact, light weight
- No external matching circuitry necessary
- Lower insertion loss
- SMT Package
- Wide variety of standard products for all the world's major telecommunications systems
- High power rating: 0.2 W
- Packages:  
F6CC (L2): 6-pad ceramic LCC (3.8 mm x 3.8 mm x 1.5 mm)  
F6CE (L2): 6-pad ceramic LCC (3.0 mm x 3.0 mm x 1.2 mm)

### Product Line-up – Standard Version

| Part Number          | System   | Part Symbol | Center Frequency (MHz) | Bandwidth (MHz) |
|----------------------|----------|-------------|------------------------|-----------------|
| FAR-F6CC-1G4410-L2ZA | PDC (Tx) | ZA          | 1441.0                 | 24              |
| FAR-F6CC-1G4890-L2ZB | PDC (Rx) | ZB          | 1489.0                 | 24              |
| FAR-F6CC-1G6190-L2ZN | PDC (Lo) | ZN          | 1619.0                 | 24              |
| FAR-F6CE-1G7475-L2YA | DCS (Tx) | YA          | 1747.5                 | 75              |
| FAR-F6CE-1G8425-L2YB | DCS (Rx) | YB          | 1842.5                 | 75              |
| FAR-F6CE-1G8800-L2XA | PCS (Tx) | XA          | 1880.0                 | 60              |
| FAR-F6CE-1G9600-L2XB | PCS (Rx) | XB          | 1960.0                 | 60              |
| FAR-F6CE-2G4500-L2WA | ISM/WLAN | WA          | 2450.0                 | 100             |

### Package

#### 6 Pad Ceramic LCC for F6CC (L2) Series



# PIEZOELECTRIC DEVICES

## M2 Series (D100) General Purpose Voltage Controlled Oscillators

The M2 series (D100) voltage controlled oscillators (VCO) operate in the frequency range of 4 to 30 MHz. The M2 series uses a single lithium tantalate piezoelectric crystal ( $\text{LiTaO}_3$ ) which has a high electromechanical coupling coefficient. The  $\text{LiTaO}_3$  also provides a wide variable frequency range and exceptional stability.

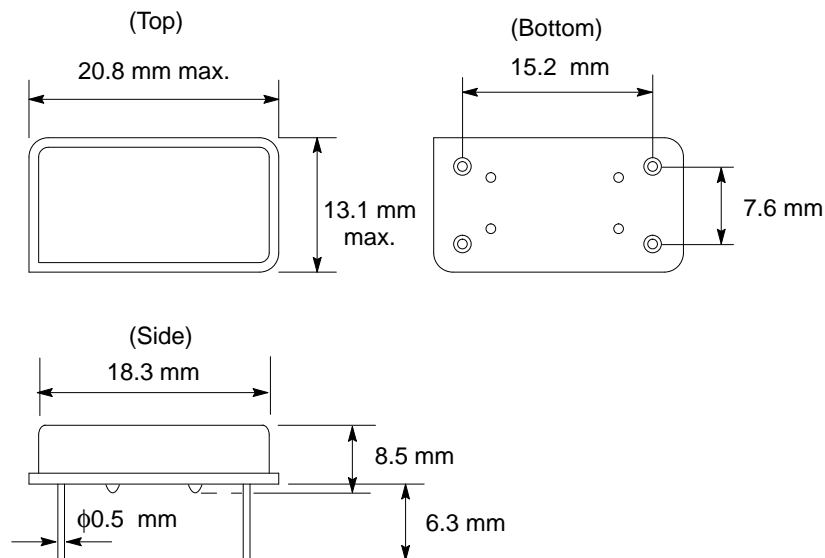
- Wide variable frequency width:  $\pm 0.2\%$
- High precision oscillation frequency, ready for use without adjustment
- High reliability due to hermetically sealed package
- Custom frequencies also available
- Package: 4 pin metal case compatible with 14 pin DIP IC package

### Standard Frequencies (MHz)

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 8.192  | 13.500 | 16.934 | 21.053 | 27.338 |
| 9.408  | 14.318 | 17.734 | 21.477 | 28.224 |
| 11.290 | 16.000 | 18.432 | 22.579 | 28.322 |
| 11.580 | 16.257 | 18.816 | 24.576 | 26.636 |
| 12.288 | 16.384 | 20.480 | 25.175 | 33.868 |

### Package

#### Metal Case DIP 14



# PIEZOELECTRIC DEVICES

## M2 Series (D300) Voltage Controlled Oscillators for Digital Audio

The M2 series (D300) voltage controlled oscillators (VCO) operate in the frequency range of 4 to 30 MHz. They use a single lithium tantalate piezoelectric crystal ( $\text{LiTaO}_3$ ) which has a high electromechanical coupling coefficient. The  $\text{LiTaO}_3$  also provides a wide variable frequency range and exceptional stability. The D300 module contains 3 VCOs for the three sampling frequencies used in digital audio equipment (32, 44.1, and 48 kHz). The frequencies are selected by external signals.

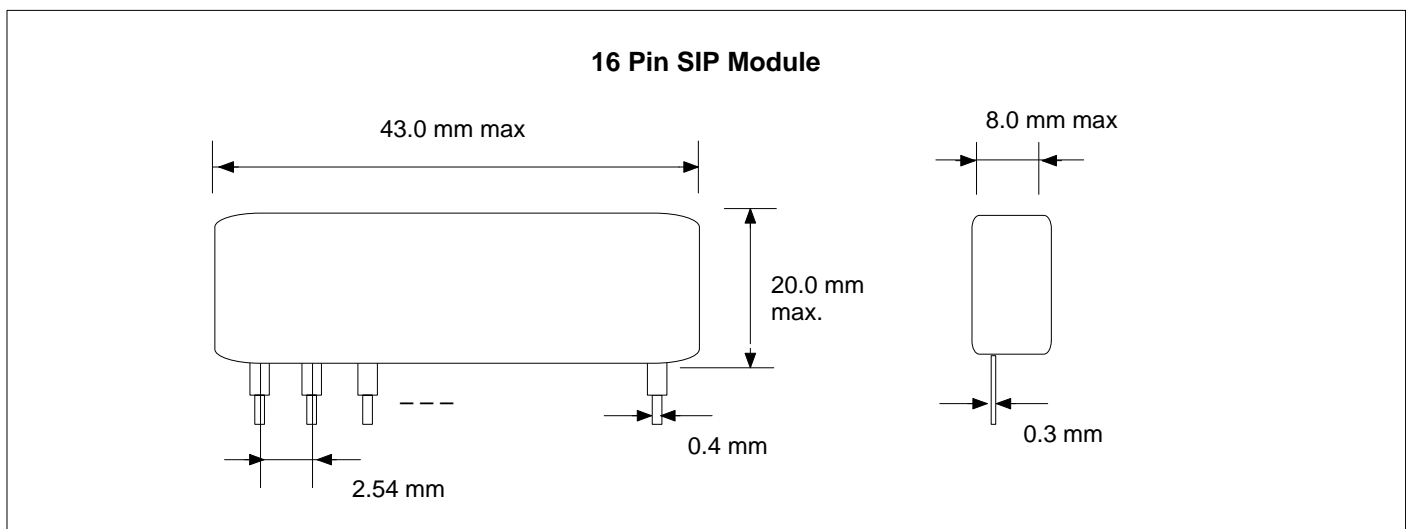
- Clock replay in response to 3 sampling frequencies (32, 44.1 and 48 kHz)
- Wider variable frequency width than in quartz crystals:  $\pm 0.1\%$  or more

- Excellent stability for signal noise reproduced by high quality of the lithium tantalate
- 100 times more stable than VCOs of LC and TTL IC configuration
- 3 sampling frequencies controlled at CMOS logic level
- Compatible with the Electronic Industry Association of Japan (EIAJ) digital I/O standard type II (consumer digital audio equipment), Level I (high resolution mode and Level II (standard resolution mode)
- Package: 16 pin Single in Line Package for high density mounting

### Standard Combinations of Frequencies

|        |              |            |                |
|--------|--------------|------------|----------------|
| Type A | $f_{01}$ (L) | 8.192 MHz  | 32 kHz x 256   |
|        | $f_{02}$ (M) | 11.290 MHz | 44.1 kHz x 256 |
|        | $f_{03}$ (H) | 12.288 MHz | 48 kHz x 256   |
| Type B | $f_{01}$ (L) | 12.288 MHz | 32 kHz x 384   |
|        | $f_{02}$ (M) | 16.934 MHz | 44.1 kHz x 384 |
|        | $f_{03}$ (H) | 18.432 MHz | 48 kHz x 384   |
| Type C | $f_{01}$ (L) | 16.384 MHz | 32 kHz x 512   |
|        | $f_{02}$ (M) | 22.579 MHz | 44.1 kHz x 512 |
|        | $f_{03}$ (H) | 24.576 MHz | 48 kHz x 512   |

### Package



# PIEZOELECTRIC DEVICES

## M3 Series (D001) General Purpose SAW Voltage Controlled Oscillators

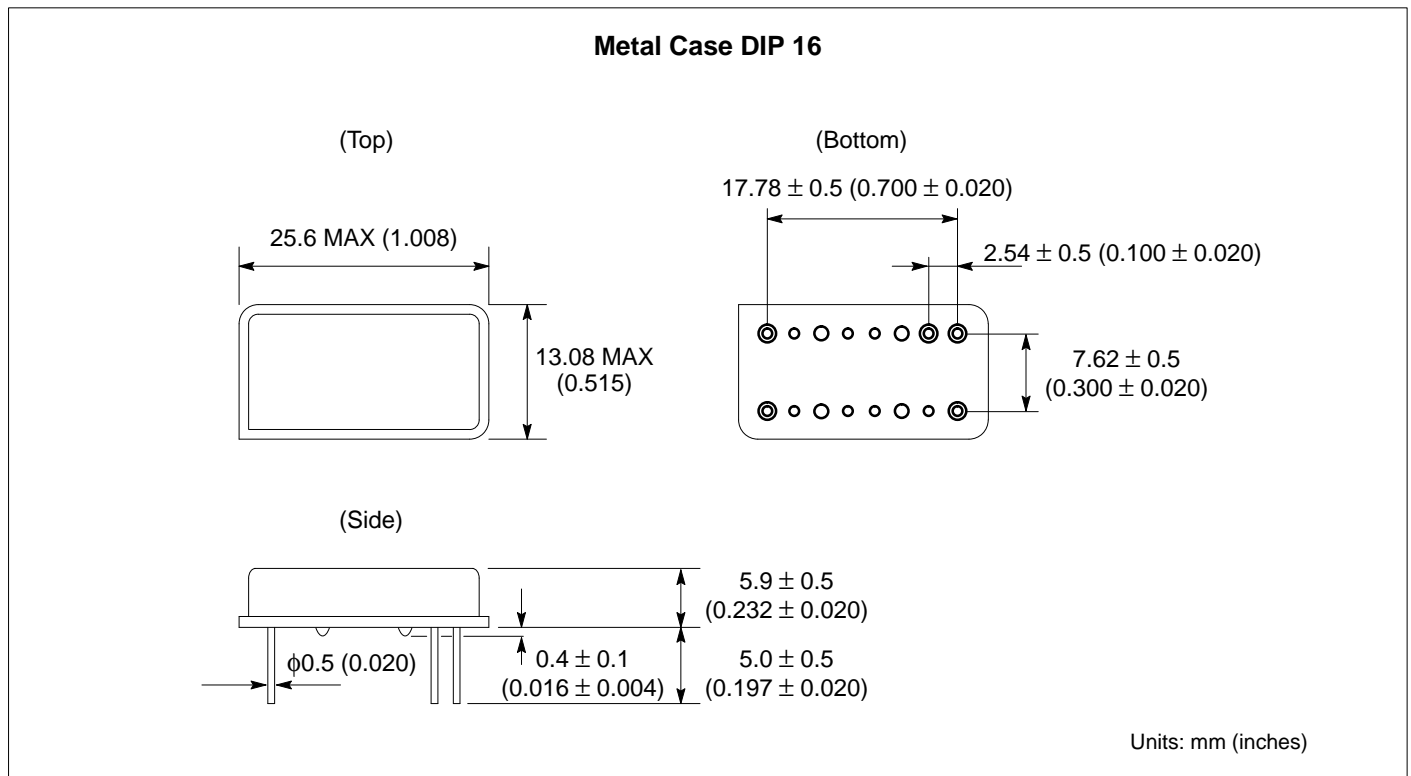
The M3 series (D001) voltage controlled oscillators (VCO) operate in the frequency range of 50 to 300 MHz. They use a single lithium tantalate ( $\text{LiTaO}_3$ ) SAW resonator. The M3 series VCOs oscillate directly in the VHF band up to 300 MHz and have a wide variable frequency range and high temperature stability.

- Direct oscillation at high frequencies: 50 to 300 MHz
- Wider variable frequency range: 800 ppm/V or more (0.5 to 4.5 V)
- Superb temperature characteristics:  $\pm 200$  ppm (0 to 60°C) or less
- High-precision oscillation frequency, ready for use without adjustment
- High reliability due to hermetically sealed package
- High carrier noise ratio: -90 dB or less (12.5 kHz detuning, 8 kHz band)
- Frequency offset by built-in offset terminal
- Package: 5 pin metal case compatible with 16 pin DIP IC package

### Standard Frequencies

| Frequency  | Application                | Part Number      |
|------------|----------------------------|------------------|
| 74.25 MHz  | Professional HDTV          | M3DA-74M250-D001 |
| 97.20 MHz  | Transmission Standard HDTV | M3DA-97M200-D001 |
| 115.52 MHz | Broad-band ISDN            | M3DA-155M52-D001 |

### Package



# PIEZOELECTRIC DEVICES

## M3 Series (D101) SAW Modulators

The M3 series (D101) SAW modulators contain direct oscillators (50 MHz to 300 MHz). They use a single lithium tantalate ( $\text{LiTaO}_3$ ) SAW resonator. The M3 series modulators can be used in direct modulation applications requiring high modulation sensitivity and a high signal to noise ratio in the VHF band (up to 300 MHz)

- High frequency direct modulation: 50 to 300 MHz
- High modulation sensitivity: 800 ppm/V min. (0.5 to 4.5 V)
- Excellent modulation distortion ratio: 40 dB max. (1 kHz to 1.75 kHz dev.)

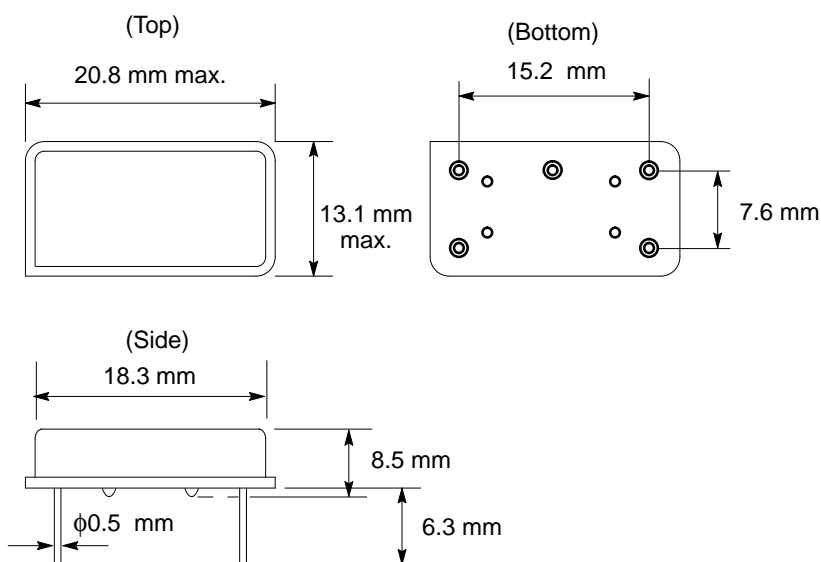
- Excellent signal to noise ratio: -50 dB max.
- Excellent temperature characteristic: + 200 ppm max. (-20 to 70°C)
- Highly reliable hermetically sealed package
- Package: 5 pin metal case compatible with 14 pin DIP IC package

## Standard Frequency

| Standard Frequency | Application  | Part Number      |
|--------------------|--------------|------------------|
| 145.0 MHz          | Mobile Phone | M3DA-145M00-D101 |

## Package

### Metal Case DIP 14





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