

MB15Cxxx Series

Low Voltage Integer Single PLL Frequency Synthesizers

■ DESCRIPTION

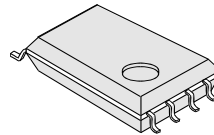
The 0.35-micron CMOS MB15C100 IF series PLLs are for use in cellular handsets and pagers. They have low voltage & low current requirements while achieving a high level of performance. The MC15C100 is Mask Programmed to customer specified requirements. The MB15C101 and MB15C103 are standard products, factory set for popular IF frequencies. The MB15C101 is ideal for PHS systems and the MB15C103 for PDC systems. They are available in an 8-pin SSOP or 16-pin BCC package.

The MB15C700 PLLs are IF PLLs with a built-in VCO. The MB15C703 is fixed tuned to 129.55 MHz. They come in the space saving 20-pin BCC package (3.4mm x 3.6mm).

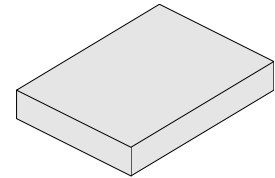
■ FEATURES

- Low operating voltage
- Low operating current
- Lock Detector
- Large choice of operating conditions
- Custom frequency – no microprocessor required

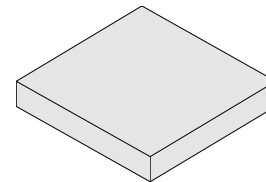
Packages



8-pin, Plastic SSOP
FPT-8P-M03



16-pad, Plastic BCC
LCC-16P-M06



20-pad, Plastic BCC
LCC-20P-M04

- Wide operating temperature: –40 to +85°C
- Packages
 - 8-pin SSOP, 16-pad BCC (MB15C1xx)
 - 20-pin BCC (MB15C7xx)
- MB15C7xx has a built-in VCO

| Parameter | MB15C1xx | MB15C101 | MB15C103 | MB15C7xx | MB15C703 |
|----------------------|--------------------------|--------------------------------------|--------------------------------------|-------------------------|----------------------------|
| Frequency - max. | 500 MHz | "H" = 233.15 MHz "L" = 259.20 MHz | "H" = 178.00 MHz "L" = 129.55 MHz | 400 MHz Built-in VCO | 129.55 MHz Built-in VCO |
| Power Supply Voltage | 3.0V | 3.0V | 3.0V | 2.5V | 2.5V |
| Power Supply Current | 1.2 mA | 1.0 mA | 0.9 mA | 4.5 mA | 2.5 mA |
| Divide Ratio | 16/17 or 32/33 | N/A | N/A | 8/9, 16/17, 32/33 | N/A |
| Program Counter | 5-4095 (mask) | N/A | N/A | 5 to 4095 (mask) | N/A |
| Swallow Counter | 0 to 31 (mask) | N/A | N/A | 0 to 31 (mask) | |
| Ref. Counter | 5-4095 (mask) | N/A | N/A | 0 to 4095 (mask) | |
| Package | 8 pin SSOP 16 pin BCC | 8 pin SSOP 16 pin BCC | 8 pin SSOP 16 pin BCC | 20 pin BCC | 20 pin BCC |

MB15C100 Series

DESCRIPTION (See data sheet at <http://edevice.fujitsu.com/fj/DATASHEET/e-ds/e680105.pdf> for complete info.)

The C-series PLL family represents Fujitsu's IF PLL offering for low voltage and low current applications. Low power operation is made possible by the use of a 0.35-micron low-threshold voltage CMOS process. The prescaler is also constructed in CMOS.

The C-series PLL family includes the MB15C100 and MB15C700 series PLLs. These intermediate frequency (IF) band PLLs are Mask Programmed to customer specific requirements. No external microprocessor is required. The MB15C101 and MB15C103 feature two sets of fixed divide ratios for the program counter, the swallow counter, and the reference counter. The MB15C101 is ideal for PHS systems and the MB15C103 for PDC systems. A single pin (DIV) will select one of the two fixed divider settings. Both devices operate over a supply range of 2.4 to 3.6V. The MB15C101 and MB15C103 are available in either an 8-pin SSOP or 16-pin BCC package.

The MB15C700 series PLLs consist of an IF PLL and a VCO on chip. These PLLs are housed in the new Fujitsu 20-pin BCC package (3.4mm x 3.6mm). This offers a tremendous mounting area and volume savings.

FEATURES

- Frequency: 500MHz max.
- Custom customer specified frequencies
- Charge pump options:
 - L type; Low sensitivity charge pump for direct modulation. (Do = 1.5 mA)
 - H type; Super charger circuit for High speed tuning. (Do = 6.0 mA)
- Low power supply voltage & current: Vcc = 2.4 V min. Icc = 1.0 mA
- Wide operating temperature: Ta = -40 to +85°C
- Selectable A or B type
 - A: "Div" type - Two different frequencies can be selected by Div input "H" or "L".
 - B: "PS" type - Power saving control

MB15C101

DESCRIPTION (See data sheet at <http://edevice.fujitsu.com/fj/DATASHEET/e-ds/e421215.pdf> for complete info.)

The Fujitsu MB15C103 is a fixed (233.15 or 259.20 MHz) Intermediate Frequency (IF) band Phase Locked Loop (PLL) synthesizer with pulse swallow operation. The reference divider and comparison divider have fixed divide ratios. There is no need for a microcontroller.

Fujitsu's CMOS technology supplies high performance with low voltage and current operation. The MB15C101 is ideally suitable for PHS systems.

FEATURES

- Low power supply current: $I_{cc} = 1.0 \text{ mA typ. @ } V_{cc} = 3 \text{ V}$
- Pulse swallow function; Prescaler: 16/17
- Setting frequency (Selectable by Div input.)
 - $f_{osc} = 19.2 \text{ MHz, } f_{IF} = 233.15 \text{ MHz (Div = "H")}$
 - $f_{osc} = 19.2 \text{ MHz, } f_{IF} = 259.20 \text{ MHz (Div = "L")}$
- Lock detector
- Low power supply voltage: $V_{cc} = 2.4 \text{ to } 3.6 \text{ V}$
- Wide operating temperature: $T_a = -40 \text{ to } 85^\circ\text{C}$

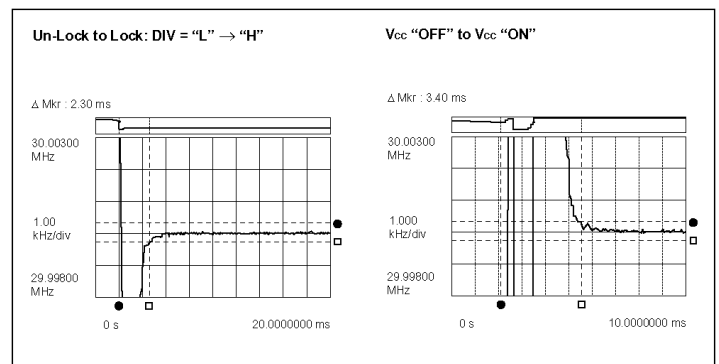
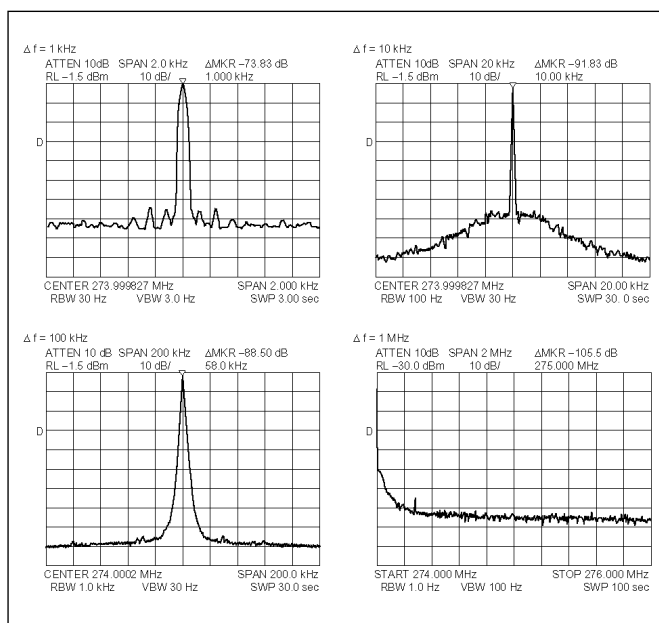
REFERENCE INFORMATION – typical, from MB15C100

V_{cc} : 3.0 V
 I_{cc} : 6 mA
 Lock frequency = 274.0 MHz ($f_r = 58 \text{ kHz}$)
 Lock up time:
 Unlock to Lock ($\pm 1 \text{ kHz}$): 2.3 ms
 Power on to Lock ($\pm 1 \text{ kHz}$): 3.4 ms

Phase noise ($f = 1 \text{ kHz}$): -88.0 dBc/Hz
 ($f = 10 \text{ kHz}$): -111.0 dBc/Hz
 ($f = 100 \text{ kHz}$): -118.0 dBc/Hz
 ($f = 1 \text{ MHz}$): -134.0 dBc/Hz
 Reference leakage ($f = 58 \text{ kHz}$): -88.5 dBc

Phase Noise

Lock-up Times



MB15C103

DESCRIPTION (See data sheet at <http://edevice.fujitsu.com/fj/DATASHEET/e-ds/e421216.pdf> for complete info.)

The Fujitsu MB15C103 is a fixed (178.00 or 129.55 MHz) Intermediate Frequency (IF) band Phase Locked Loop (PLL) synthesizer with pulse swallow operation. The reference divider and comparison divider have fixed divide ratios. There is no need for a microcontroller. Fujitsu's CMOS technology supplies high performance with low voltage and current operation. The MB15C103 is ideally suitable for PHS systems.

FEATURES

- Low power supply current: $I_{cc} = 0.9 \text{ mA typ.}$
- Selectable frequencies: 178.00 MHz or 129.55 MHz
- Lock detector
- Low power supply voltage: $V_{cc}: 2.4 \text{ to } 3.6 \text{ V}$
- Wide operating temperature: $T_a: -40 \text{ to } +85^\circ\text{C}$

REFERENCE INFORMATION

$V_{cc}: 3.0 \text{ v}$

$I_{do}: 6 \text{ mA}$

Lock frequency: 178 MHz ($f_r = 400 \text{ kHz}$)

Lock up time:

Unlock to Lock ($\pm 1 \text{ kHz}$): 350 μs

Power on to Lock ($\pm 1 \text{ kHz}$): 2.15 ms

Phase noise ($f = 1 \text{ kHz}$): -97.1 dBc/Hz

($f = 10 \text{ kHz}$): -99.8 dBc/Hz

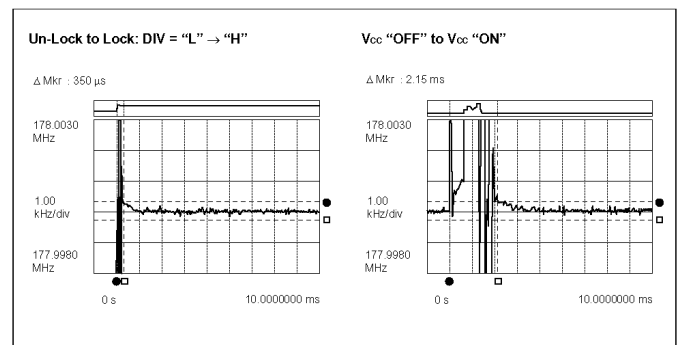
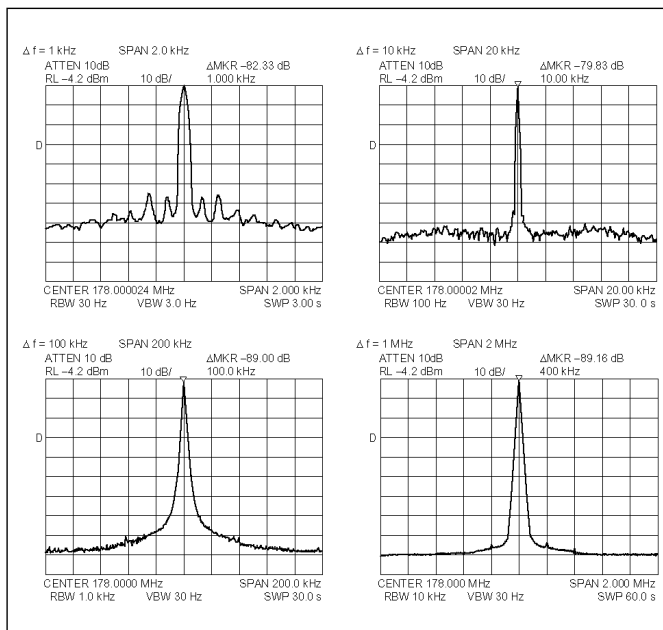
($f = 100 \text{ kHz}$): -119.0 dBc/Hz

($f = 1 \text{ MHz}$): -130.1 dBc/Hz

Reference leakage ($\Delta f = 400 \text{ kHz}$): -89.2 dBc

Phase Noise

Lock-up Times



MB15C700

DESCRIPTION (See data sheet at <http://edevic.fujitsu.com/fj/DATASHEET/e-ds/e680106.pdf> for complete info.)

The MB15C700 series are Phase Locked Loop (PLL) frequency synthesizers with a built-in VCO. They are suitable for Intermediate Frequency band PLLs in mobile phones.

An external inductor and capacitor set the VCO frequency. The fixed reference divider and comparison divider ratios are specified by the customer. No external microcontroller is required. With a supply voltage of 2.5 V the current draw is only 4.5 mA typ. The small BCC-20 plastic package saves space.

FEATURES

PLL

- Pulse swallow function
- 400 MHz High-speed Prescaler: 8/9, 16/17, 32/33
- MASK ROM of the dividers.
 - Main counter: 5 to 4095
 - Swallow counter: 0 to 31
 - Reference counter: 5 to 4095 (to 26 MHz)
- Lock detector circuit.
- Charge pump options:
 - H type: 4.5 mA at 2.5 V)
 - L type: 1.125 mA at 2.5 V)

BUILT-IN VCO

- Integrated vari-cap
- External TANK circuit

COMMON

- Low power supply voltage: 2.3 V to 2.7 V
- Low power supply current: 4.5 mA typ.
- Operating temperature: -20 °C to +85 °C

REFERENCE INFORMATION – typical, from MB15C703

Vcc: 2.50 v

Do: 4.5 mA

Lock frequency: 129.55 MHz (fr = 50 kHz)

Lock up time:

PS mode to Lock (± 300 Hz): 622 μ s

Phase noise (f = 1 kHz): -71.3 dBc/Hz

(f = 50 kHz): -108.8 dBc/Hz

(f = 100 kHz): -113.0 dBc/Hz

Reference leakage ($\Delta f = 50$ kHz): -67.3 dBc

MB15C703

DESCRIPTION (See data sheet at <http://edevice.fujitsu.com/fj/DATASHEET/e-ds/e421366.pdf> for complete info.)

The MB15C703 is a fixed frequency (129.55 MHz) Phase Locked Loop (PLL) frequency synthesizer with a built-in VCO. Its small size and component integration make it an ideal part for mobile phones. The VCO requires only an external inductance and capacitor. The divider ratios are fixed so no external microcontroller is needed. The small BCC-20 plastic package saves board space. With a supply voltage of 2.5 V it draws 2.5mA typ.

FEATURES

- Factory programmed to 129.55 MHz with a reference frequency of 12.8 MHz
- Lock detector circuit
- Low power supply voltage: 2.3 V to 2.7 V
- Low power supply current: 2.5 mA typ.
- Wide operating temperature: -20 °C to +85 °C
- High-speed 4.5 mA charge pump
- Built-in VCO

REFERENCE INFORMATION

Vcc: 2.50 v

Do: 4.5 mA

Lock frequency: 129.55 MHz (fr = 50 kHz)

Lock up time:

PS mode to Lock (± 300 Hz): 622 μ s

Phase noise (f = 1 kHz): -71.3 dBc/Hz

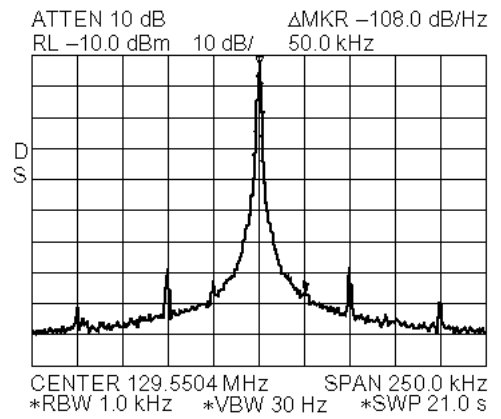
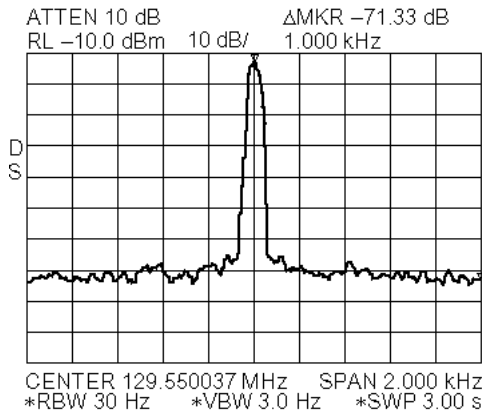
(f = 50 kHz): -108.0 dBc/Hz

(f = 100 kHz): -113.0 dBc/Hz

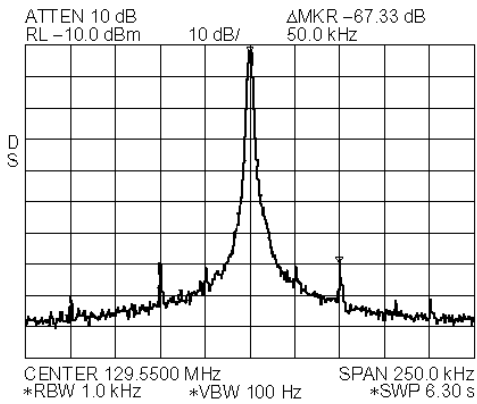
Reference leakage ($\Delta f = 50$ kHz): -67.3 dBc

See next page for Graphs.

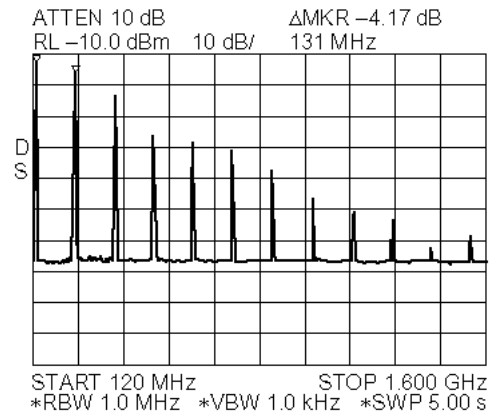
Phase Noise



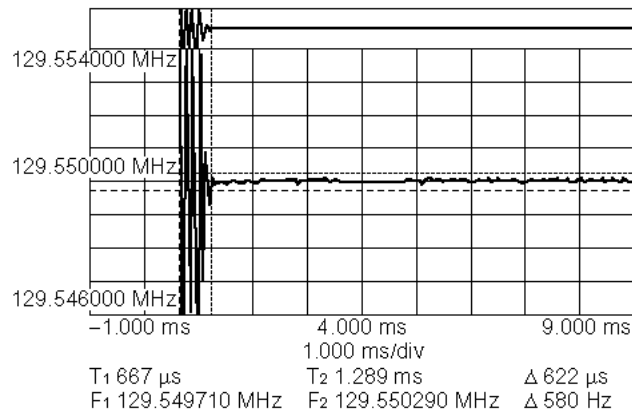
Spurious



Harmonics

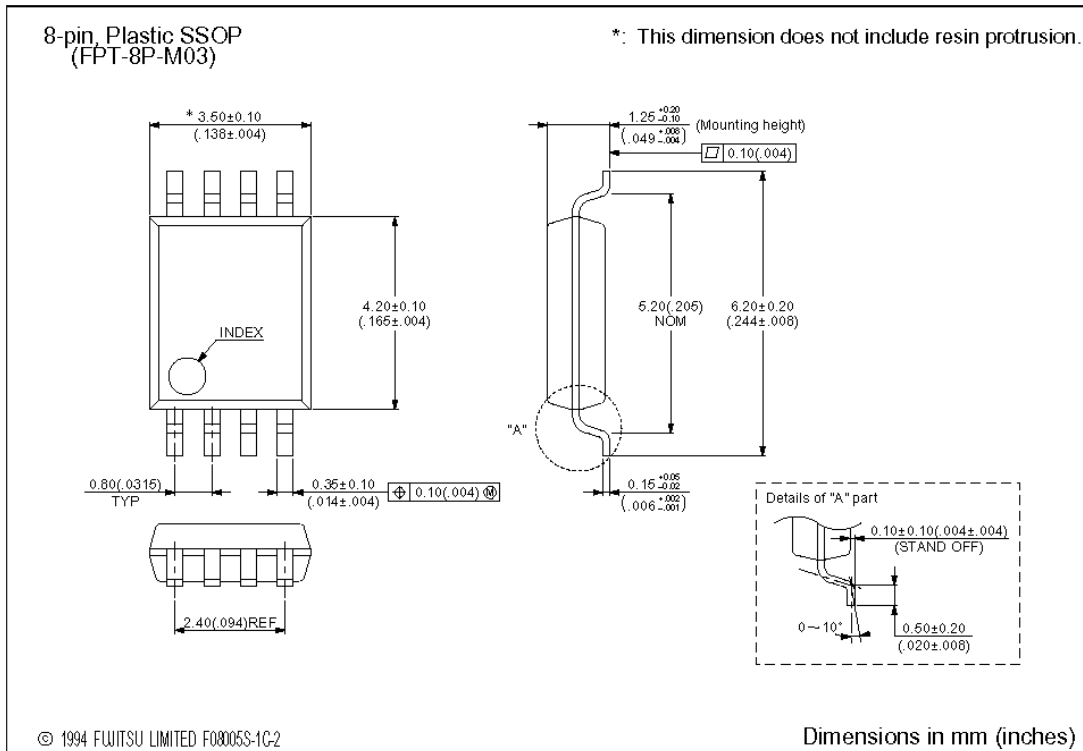


PS OFF to ON mode - Lock-up time

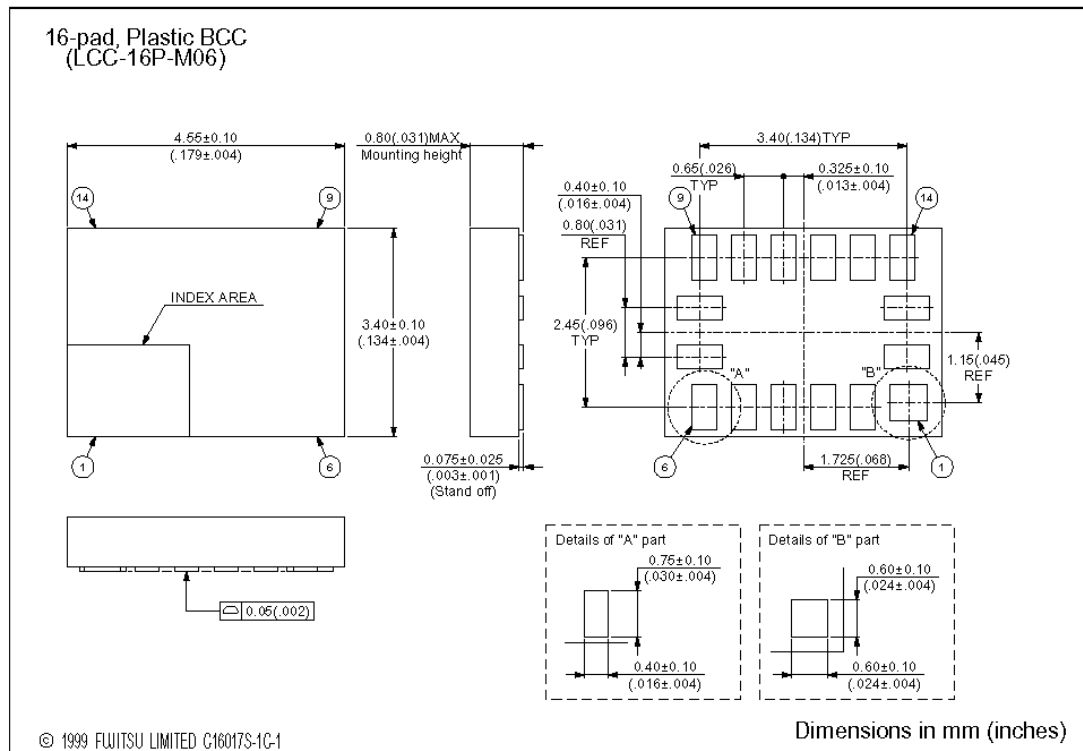


PACKAGE DIMENSIONS

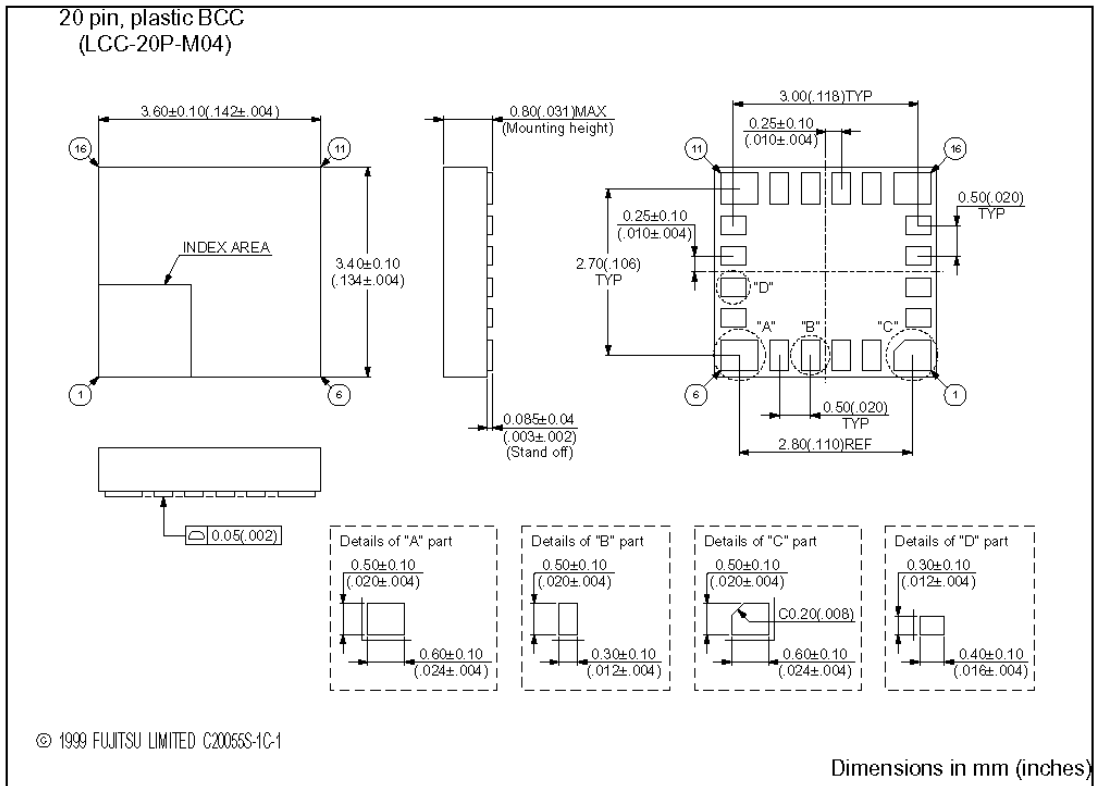
MB15C10xPFV - 8 pin, Plastic SSOP (FPT-8P-M03)



MB15C10xPV1 – 16 pad, Plastic BCC (LCC-16P-M06)



MB15C70xPV - 20 pin, Plastic BCC (LCC-20P-M04)



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