

## LINEAR IC

# 1 CHANNEL 8-BIT D/A CONVERTER

## MB4072

### 1 CHANNEL 8-BIT D/A CONVERTER

The Fujitsu MB4072 is a High-Speed Digital to Analog Converter IC. The MB4072's current outputs are high impedance open-collector, which provide voltage output with a load or current to voltage converter for various applications with operational amplifiers, microcomputers, etc.

Threshold level of digital inputs is variable with the level control input for various interface level.

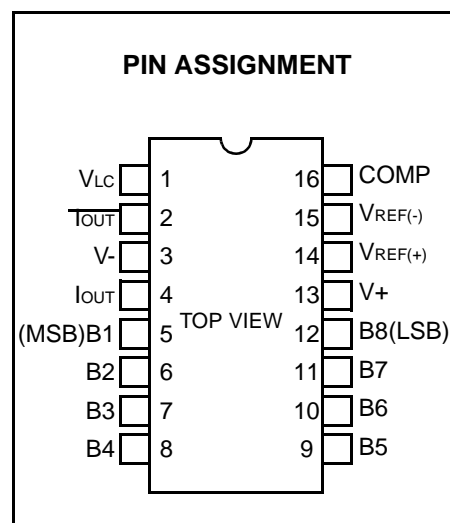
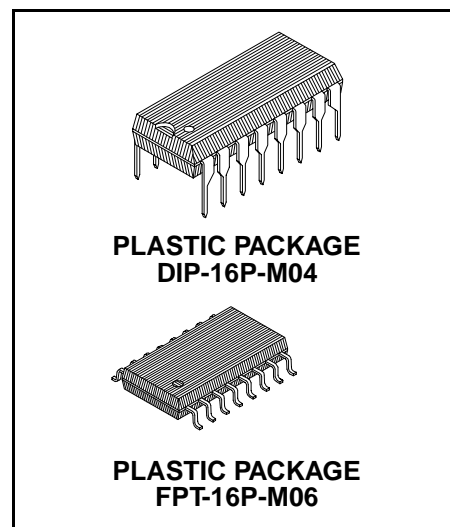
- Settling Time : 85ns
- Linearity Error :  $\pm 0.19\%$ max.
- Full-scale Temperature coefficient:  $\pm 10$ ppm/ $^{\circ}$ C typ.
- Output Voltage Compliance : -10V to +18V
- Multiplying Operation
- True/Complimentary Current Sink Output
- Adjustable Threshold Level of Digital Inputs : Interface directly with TTL, CMOS, ECL, etc.
- Wide Supply Voltage Range :  $\pm 4.5$ V to  $\pm 18$ V
- Low Power Consumption : 33mW at  $\pm 5$ V typ.
- Operation Temperature :  $-40^{\circ}$ C to  $+85^{\circ}$ C
- Compatible with DAC-08
- Package : Plastic DIP Package: (Suffix: -P)  
Plastic FPT Package: (Suffix: -PF)

### ■ ABSOLUTE MAXIMUM RATINGS

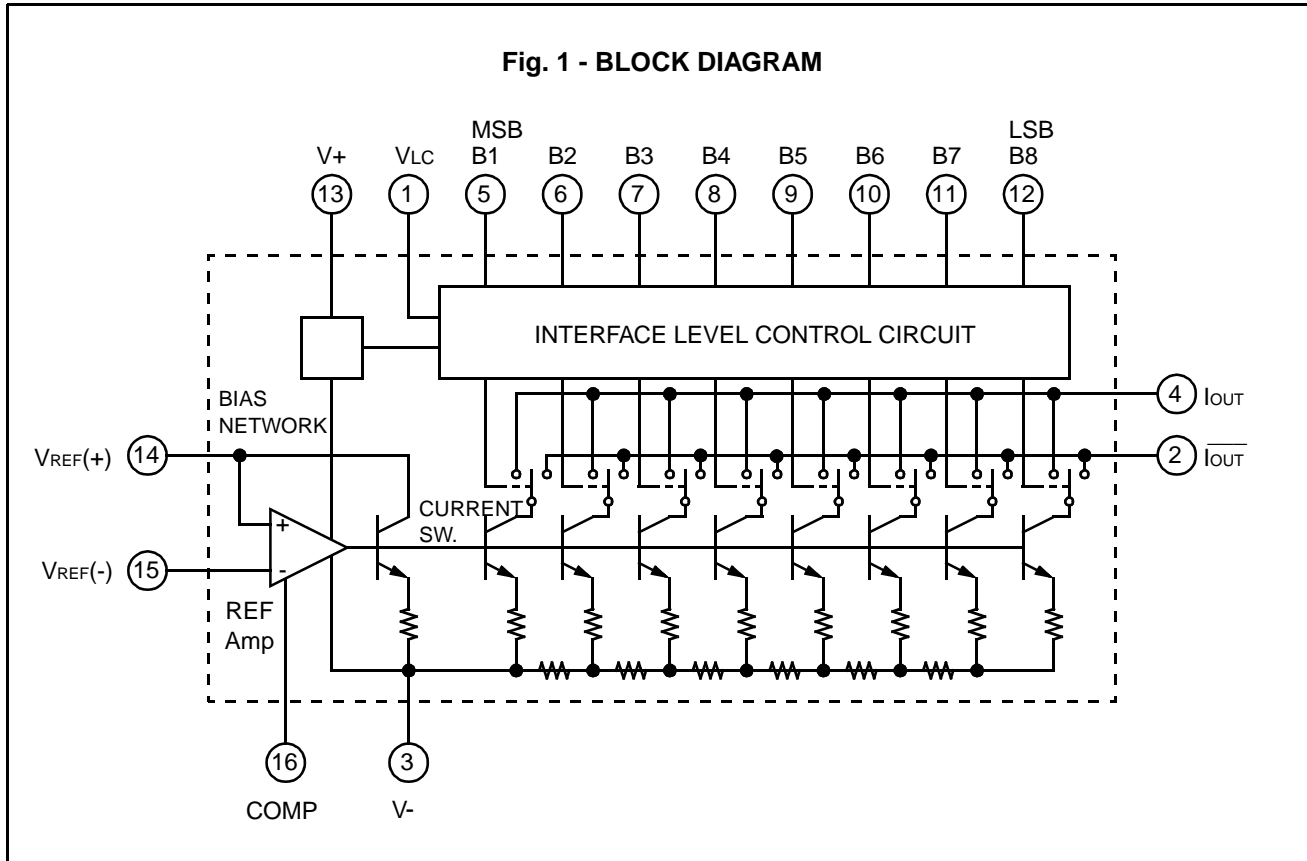
( $T_A = 25^{\circ}$ C)

Parameter	Symbol	Value	Unit
Supply Voltage	V+ to V-	37	V
Digital Input Voltage	V <sub>I</sub>	V- to V- +37	V
Threshold Control Voltage	V <sub>LC</sub>	V- to V+	V
Reference Input Voltage	V <sub>REF(+)</sub>	V- to V+	V
	V <sub>REF(-)</sub>	V- to V+	V
Differential Reference Input Voltage	V <sub>REF(+)</sub> to V <sub>REF(-)</sub>	$\pm 18.5$	V
Reference Input Current	I <sub>REF</sub>	5	mA
Power Consumption	P <sub>D</sub>	500	mW
Storage Temp.	T <sub>STG</sub>	-55 to +125	$^{\circ}$ C

**NOTE:** Permanent device damage may occur if the above **Absolute Maximum Ratings** are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.



## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
		Supply Voltage	V+	+4.5	
	V-	-18	-	-4.5	V
Operating Temperature	T <sub>A</sub>	-40	-	+85	°C

## ■ ELECTRICAL CHARACTERISTICS

(Recommended Operating Conditions unless otherwise noted.)

(V+ = +15V, V- = -15V, IREF = 2.0mA, TA = -40°C to +85°C )

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Resolution		8	8	8	bits
Monotonicity		8	8	8	bits
Linearity Error	LE	-	-	±0.19	% (FSR)
Settling Time (Final Value: ±1/2 LSB, TA=25°C, On/Off Switching for Each bit/All bits)	ts	-	85	150	ns
Propagation Delay Time (TA=25°C, On/Off Switching for Each bit/All bits)	tPLH tPHL	-	35	60	ns
Temperature coefficient at full-scale	TCIFS	-	±10	±50	ppm/°C
Output Voltage Range (ΔIFS 1/2 LSB, ROUT 20MΩ typ.)	VOC	-10	-	+18	V
Output Current at full-scale (VREF=10.000V, R14=5.000kΩ, R15=5.000kΩ, TA=25°C)	IFS4	1.94	1.99	2.04	mA
Symmetry at full-scale (IFS=IFS4-IFS2)	TFSS	-	±1.0	±8.0	μA
Output Current at zero scale	IZS	-	0.2	2.0	μA
Output Current Range (R14=5.000kΩ, R15=5.000kΩ, VREF=+15.0V, V=-10V)	IOR1	2.1	-	-	mA
Output Current Range (R14=5.000kΩ, R15=5.000kΩ, VREF=+25.0V, V=-12V)	IOR2	4.2	-	-	mA
Low-level Input Voltage (VLC=0V)	VIL	-	-	0.8	V
High-level Input Voltage (VLC=0V)	VIH	2.0	-	-	V
Low-level Input Current (VLC=0V, VIN=-10V to +0.8V)	IIL	-	-0.2	-10	μA
High-level Input Current (VLC=0V, VIN=2.0V to 18V)	IIH	-	0.002	10	μA

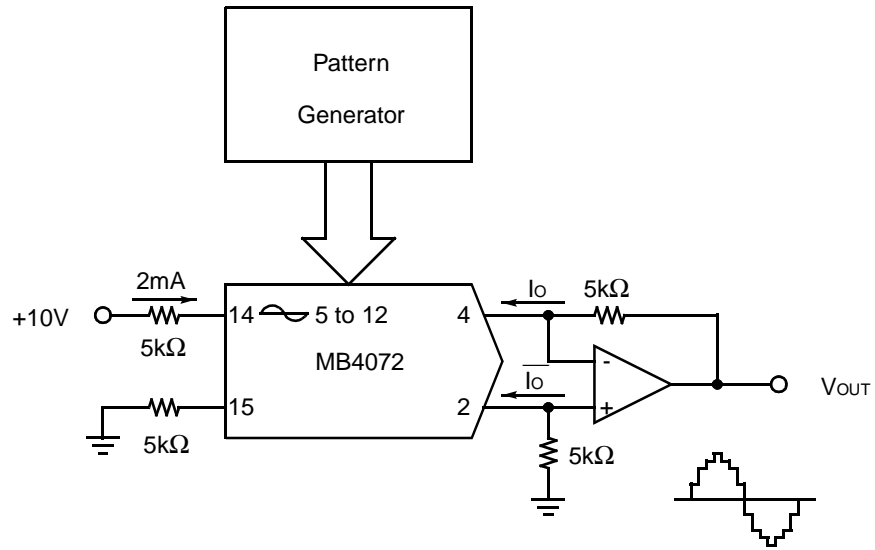
## ■ ELECTRICAL CHARACTERISTICS (Continued)

(V<sub>S</sub>=±15V, I<sub>REF</sub> = 2.0mA, T<sub>A</sub> = -40°C to +85°C)

Parameter	Symbol	Value			Unit	
		Min	Typ	Max		
Logic Input Voltage Range (V <sub>-</sub> =-15V)	V <sub>IS</sub>	-10	-	+18	V	
Logic Threshold Voltage Range (V <sub>+</sub> =+15V, V <sub>-</sub> =-15V)	V <sub>THR</sub>	-10	-	+13.5	V	
Reference Bias Current	I <sub>IS</sub>	-	-1.0	-3.0	μA	
Reference Input Through Rate (R <sub>EQ</sub> =200Ω, R <sub>L</sub> =100Ω, C <sub>L</sub> =0pF)	$\frac{dI}{dt}$	4.0	8.0	-	mA/μs	
Supply Voltage Sensitivity* (V <sub>+</sub> =+4.5V to +18V, I <sub>REF</sub> =1mA)	PSS <sub>IFS+</sub>	-	±0.0003	±0.01	%/%	
Supply Voltage Sensitivity* (V <sub>-</sub> =-4.5V to -18V, I <sub>REF</sub> =1mA)	PSS <sub>IFS-</sub>	-	±0.002	±0.01	%/%	
Supply Current	(V <sub>+</sub> =+5V, V <sub>-</sub> =-5V, I <sub>REF</sub> =1.0mA)	I <sub>-</sub>	-	2.3	3.8	mA
		I <sub>-</sub>	-	-4.3	-5.8	mA
	(V <sub>+</sub> =+5V, V <sub>-</sub> =-15V, I <sub>REF</sub> =2.0mA)	I <sub>-</sub>	-	2.4	3.8	mA
		I <sub>-</sub>	-	-6.4	-7.8	mA
	(V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, I <sub>REF</sub> =2.0mA)	I <sub>-</sub>	-	2.5	3.8	mA
		I <sub>-</sub>	-	-6.5	-7.8	mA
Power Dissipation	(V <sub>+</sub> =+5V, V <sub>-</sub> =-5V, I <sub>REF</sub> =1.0mA)	P <sub>D</sub>	-	33	48	mW
	(V <sub>+</sub> =+5V, V <sub>-</sub> =-15V, I <sub>REF</sub> =2.0mA)	P <sub>D</sub>	-	103	136	mW
	(V <sub>+</sub> =+15V, V <sub>-</sub> =-15V, I <sub>REF</sub> =2.0mA)	P <sub>D</sub>	-	135	174	mW

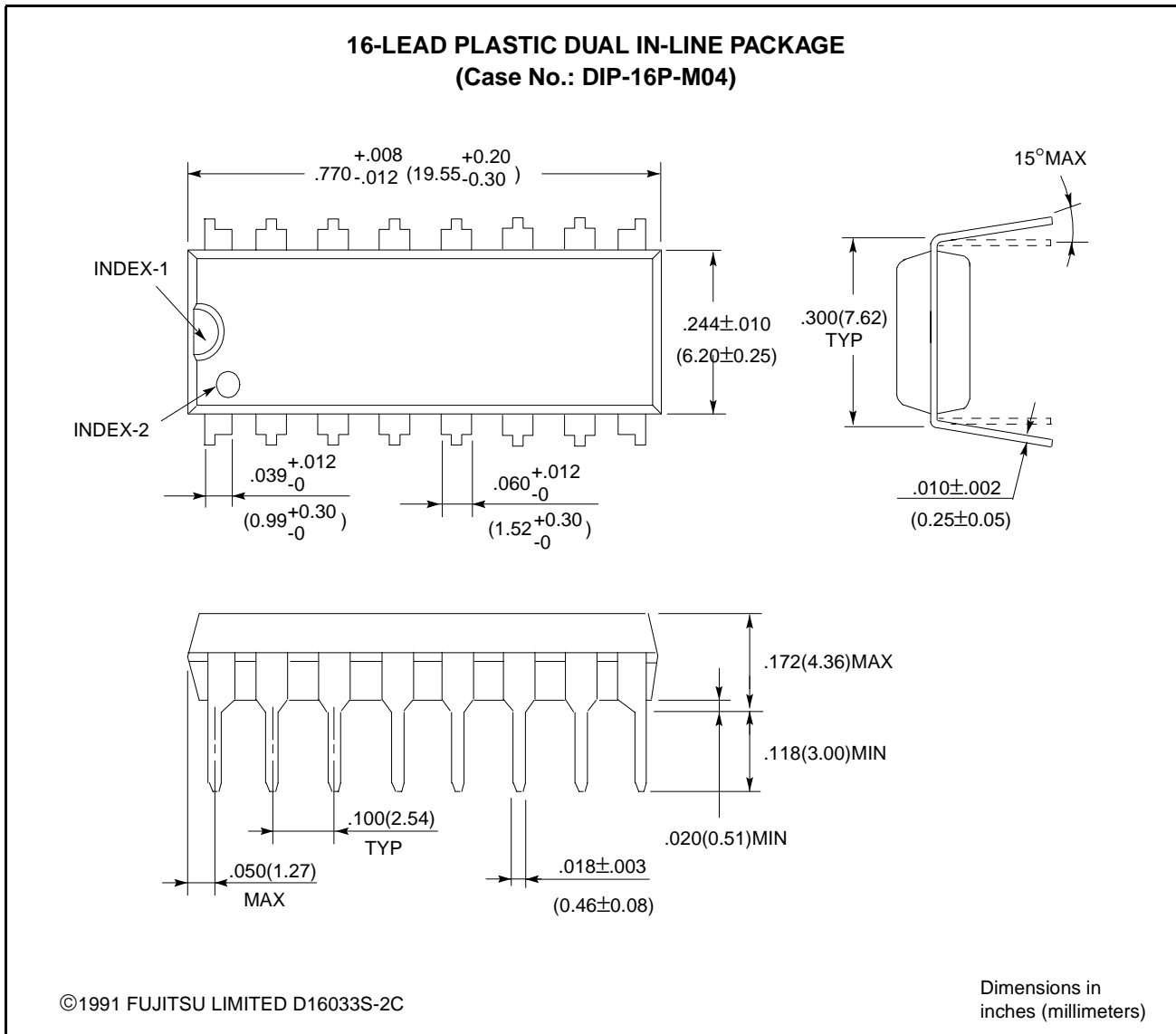
\*Note:  $PSS_{IFS} = \left( \frac{\Delta I_{FS}}{I_{FS}} \times 100 \right) / \left( \frac{18-4.5}{15} \times 100 \right)$

Fig. 2 - WAVEFORM SYNTHESIZER

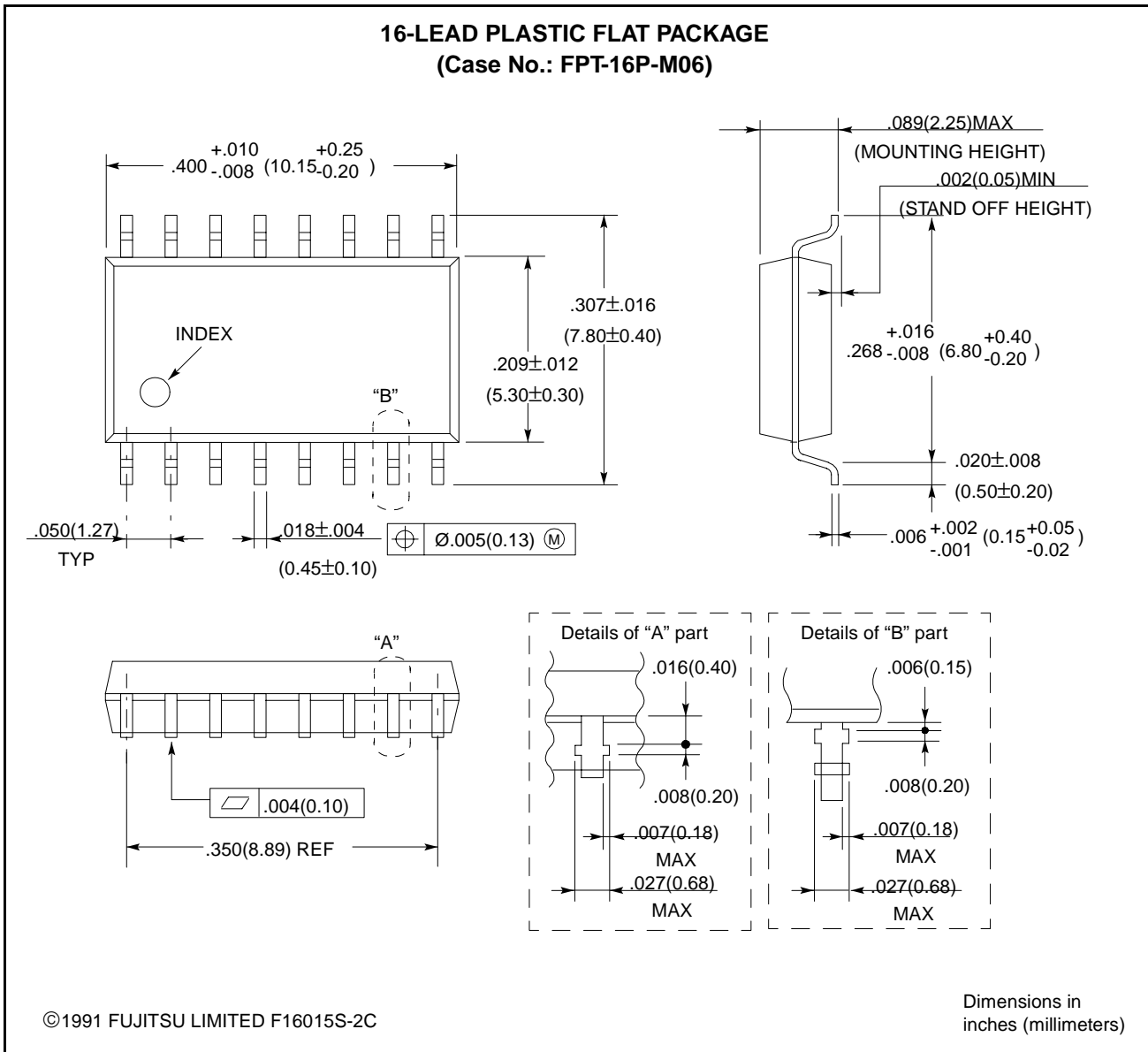


# MB4072

## ■ PACKAGE DIMENSIONS



■ PACKAGE DIMENSIONS (Continued)



## FUJITSU LIMITED

*For further information please contact:*

### **Japan**

FUJITSU LIMITED  
Corporate Global Business Support Division  
Electronic Devices  
KAWASAKI PLANT, 1015, Kamikodanaka  
Nakahara-ku, Kawasaki-shi  
Kanagawa 211, Japan  
Tel: (044) 754-3753  
Fax: (044) 754-3329

### **North and South America**

FUJITSU MICROELECTRONICS, INC.  
Semiconductor Division  
3545 North First Street  
San Jose, CA 95134-1804, U.S.A.  
Tel: (408) 922-9000  
Fax: (408) 432-9044/9045

### **Europe**

FUJITSU MIKROELEKTRONIK GmbH  
Am Siebenstein 6-10  
63303 Dreieich-Buchsschlag  
Germany  
Tel: (06103) 690-0  
Fax: (06103) 690-122

### **Asia Pacific**

FUJITSU MICROELECTRONICS ASIA PTE. LIMITED  
No. 51 Bras Basah Road,  
Plaza By The Park,  
#06-04 to #06-07  
Singapore 189554  
Tel: 336-1600  
Fax: 336-1609

F9601

© FUJITSU LIMITED Printed in Japan

All Rights Reserved.

Circuit diagrams utilizing Fujitsu products are included as a means of illustrating typical semiconductor applications. Complete information sufficient for construction purposes is not necessarily given.

The information contained in this document has been carefully checked and is believed to be reliable. However, Fujitsu assumes no responsibility for inaccuracies.

The information contained in this document does not convey any license under the copyrights, patent rights or trademarks claimed and owned by Fujitsu.

Fujitsu reserves the right to change products or specifications without notice.

No part of this publication may be copied or reproduced in any form or by any means, or transferred to any third party without prior written consent of Fujitsu.

The information contained in this document are not intended for use with equipments which require extremely high reliability such as aerospace equipments, undersea repeaters, nuclear control systems or medical equipments for life support.