To our customers,

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Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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HA13721RP/FP

CAN Transceiver

REJ03F0116-0100Z
Rev.1.00
Jul 23, 2004

Description

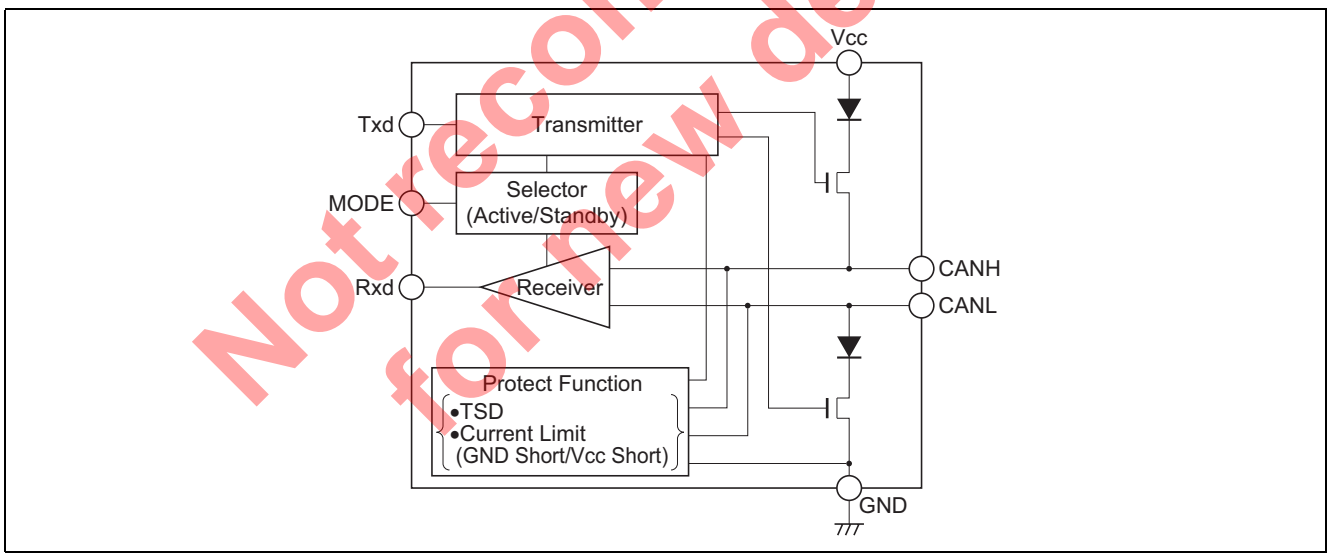
HA13721RP/FP is a Interface IC between CAN protocol controller and CAN bus.

This IC provides functions that transmit data from Microcontroller to CAN bus and receive data through CAN bus to Microcontroller.

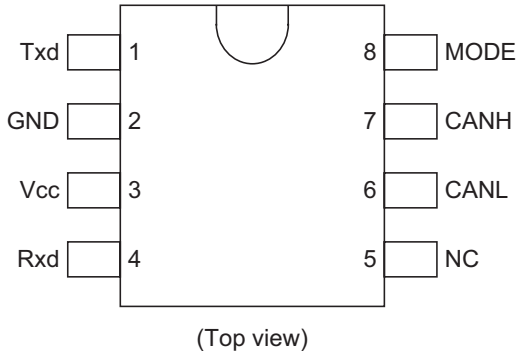
Functions

- "ISO-11898" compliant
- High speed CAN (up to 1 Mbps)
- Active ⇔ Standby mode
- Over temperature detection
- Over current detection (Vcc short / GND short detection)
- Optimized EMI performance
- Txd, MODE input pin ; 3.3 V compatible

Block Diagram



Pin Arrangement



(Top view)

Pin Description

Pin No.	Pin Name	Function
1	Txd	Transmit data input. Connected with Microcontroller / Txd pin.
2	GND	Ground pin
3	Vcc	Power supply (5.0 V)
4	Rxd	Receive data output. Connected with Microcontroller / Rxd pin.
5	NC	Non connected
6	CANL	CAN bus low level
7	CANH	CAN bus high level
8	MODE	Select input (Active / Standby mode)

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings		Unit	Application Pin
		HA13721RPJE	HA13721FPK		
Supply voltage	Vcc	–0.3 to +5.5	–0.3 to +5.5	V	Vcc
Input voltage	Vin	–0.3 to Vcc+0.3	–0.3 to Vcc+0.3	V	Txd, MODE
		–5.0 to +36.0	–5.0 to +36.0	V	CANL, CANH
Operating temperature	Topr	–40 to +105	–40 to +125	°C	
Storage temperature	Tstg	–50 to +125	–50 to +150	°C	

Note: HA13721RPJE: JEDEC package
HA13721FPK: JEITA package

Electrical Characteristics

(Ta = 25°C, 4.5 V < Vcc < 5.5 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Application Pin
Supply voltage	Vcc	4.5	—	5.5	V		Vcc
Supply current 1	IccD	—	—	75	mA	Txd: GND, MODE: GND CANL–CANH: 60 Ω Terminal resistor	Vcc
Supply current 2	IccR	—	1.5	6	mA	Txd: open, MODE: GND CANL–CANH: 60 Ω Terminal resistor	Vcc
Supply current 3	IccStby	—	—	250	µA	Txd: open, MODE: open CANL, CANH: open	Vcc

Transmitter Section

- RL = 60 Ω (CANL to CANH Terminal resistor)
- Vdiff = VCANH–VCANL
- Recessive; Txd = Vcc, MODE = GND
- Dominant; Txd = GND, MODE = GND

(Ta = 25°C, 4.5 V < Vcc < 5.5 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Application Pin
Input high voltage	VIH	2.4	—	Vcc+0.3	V		Txd, MODE
Input low voltage	VIL	–0.3	—	0.8	V		Txd, MODE
Input resistance	Rin	13.5	27	54	kΩ		Txd, MODE
Recessive bus voltage	VCANL, VCANH	2	—	3	V	Recessive (Vcc = 5.0V)	CANL, CANH
Leakage current	ILO	–2	—	2	mA	–2.0V < CANL, CANH < 7.0V	CANL, CANH
Output voltage	VCANH	3	—	4.5	V	Dominant	CANH
	VCANL	0.5	—	2	V	Dominant	CANL
Difference output voltage	Vdiff	1.5	—	3	V	Dominant 4.75 V < Vcc < 5.25 V 42.5 Ω < RL < 60 Ω	CANL, CANH
		–0.5	—	0.05	V	Recessive	
Output short current	IsCANH	–200	—	–70	mA		CANH
	IsCANL	70	—	200	mA		CANL
Thermal shutdown point	TSD	150	—	190	°C		*1
	TSD(hys)	—	10	—	°C		*1

Note: 1. It is design specification. The examination at the time of delivery is not performed.

Receiver Section

- RL = 60 Ω (CANL to CANH Terminal resistor)
- Vdiff = VCANH–VCANL
- Txd = Vcc, MODE = GND, –2.0 V < CANL, CANH < 7.0 V

(Ta = 25°C, 4.5 V < Vcc < 5.5 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Application Pin
Difference input voltage (Recessive)	Vdiff(R)	—	—	0.5	V		CANL, CANH
Difference input voltage (Dominant1)	Vdiff(D1)	0.9	—	—	V		CANL, CANH
Difference input voltage (Dominant2)	Vdiff(D2)	1.0	—	—	V	MODE: Vcc	CANL, CANH
Difference input voltage (hysteresis)	Vdiff(hys)	100	—	200	mV	Vdiff(hys) = Vdiff(D1) – Vdiff(R)	CANL, CANH
Output high voltage	VOH	0.8Vcc	—	Vcc	V	IRxd = –100 µA	Rxd
Output low voltage	VOL	—	—	0.1Vcc	V	IRxd = 1 mA	Rxd
Input resistance (CANH)	Rin	10	—	50	kΩ		CANH
Input resistance (CANL)	Rin	10	—	50	kΩ		CANL
Input resistance (CANH, CANL)	Rdiff	20	—	100	kΩ		CANL, CANH

Receiver Section

- RL = 60 Ω (CANL to CANH Terminal resistor)
- CL(CANL to CANH) = 100 pF
- Txd input tr/tf = 5.0 ns/1.2 V
- CRxd(Rxd to GND) = 30 pF

(Ta = 25°C, 4.5 V < Vcc < 5.5 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Application Pin
Baud rate		—	—	1	Mbps		
Delay time 1	tonTxd	—	80	160	ns	MODE: GND, refer fig.1(1)	Txd, CANL, CANH
Delay time 2	toffTxd	—	100	180	ns	MODE: GND, refer fig.1(1)	Txd, CANL, CANH
Delay time 3	tonRxd	—	120	280	ns	MODE: GND, refer fig.1(1)	Txd, Rxd
Delay time 4	toffRxd	—	140	280	ns	MODE: GND, refer fig.1(1)	Txd, Rxd
Delay time 5	tConRxd	—	—	150	ns	MODE: GND, refer fig.1(1)	Rxd, CANL, CANH
Delay time 6	tCoffRxd	—	—	150	ns	MODE: GND, refer fig.1(1)	Rxd, CANL, CANH
Wakeup 1	tWAKE	—	—	20	µs	Txd: GND, refer fig.1(2)	MODE, Rxd
Wakeup 2	tdRxdL	—	—	3	µs	Txd: Vcc, MODE: Vcc, refer fig.1(3)	CANL,CANH, Rxd

Function Table

Txd	MODE	Division No.	Mode	CANL	CANH	Rxd
0	0	Fig.1(1)	Dominant	Low (output)	High (output)	0
1 or floating	0	Fig.1(1)	Recessive	floating	floating	1
—	1 or floating	Fig.1(2)	Standby	floating	floating	1
—	1 or floating	Fig.1(3)	Dominant(Wakeup)	Low (input)	High (input)	0

Timing Chart

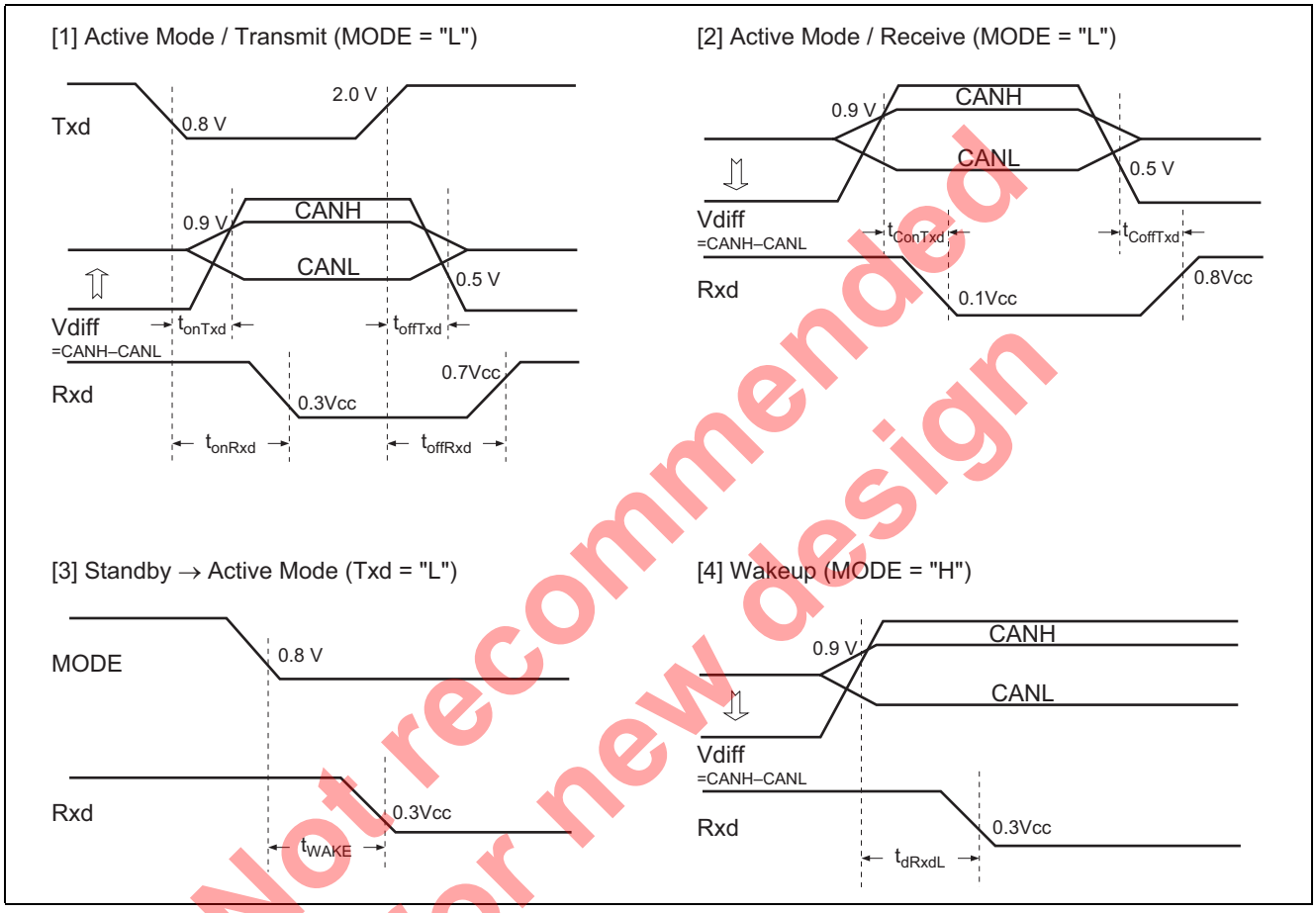
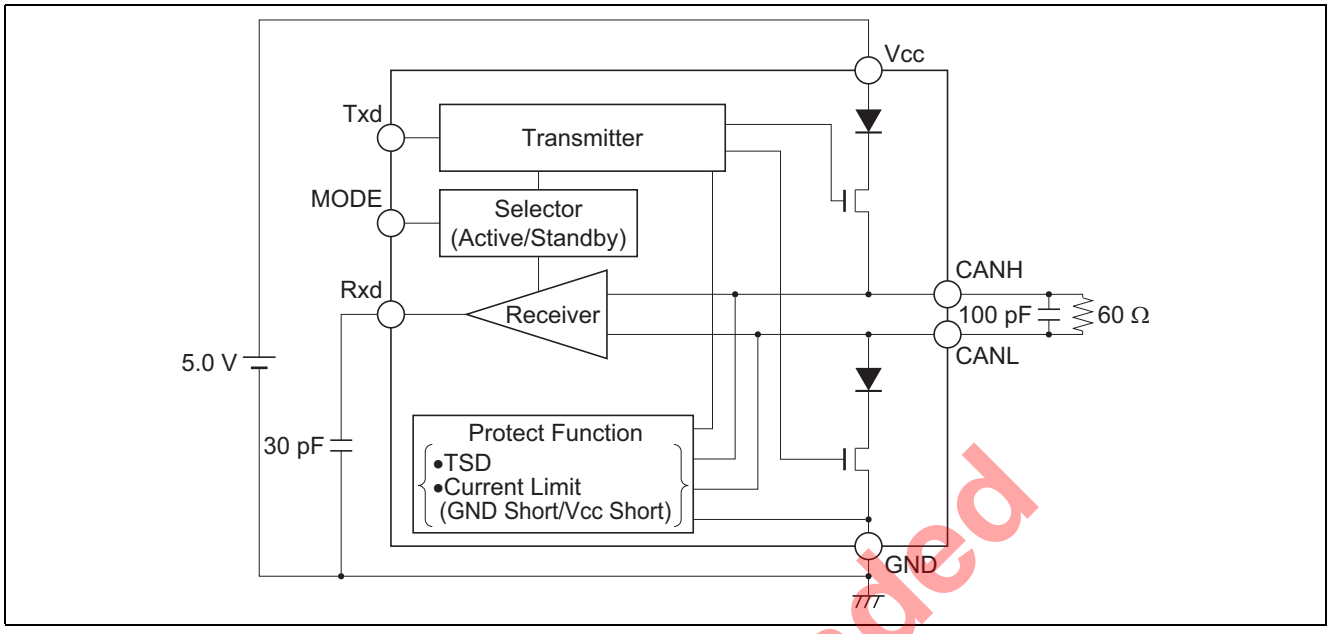
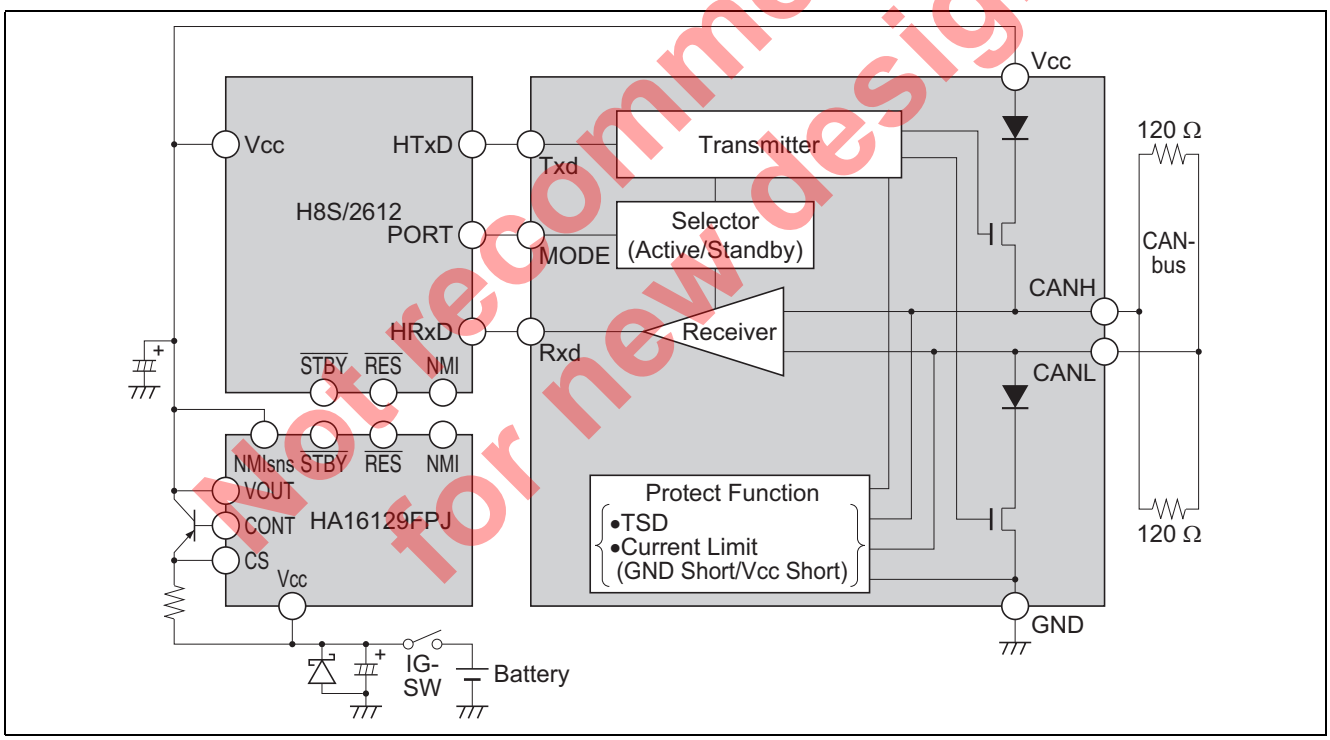


Figure 1 Timing Chart

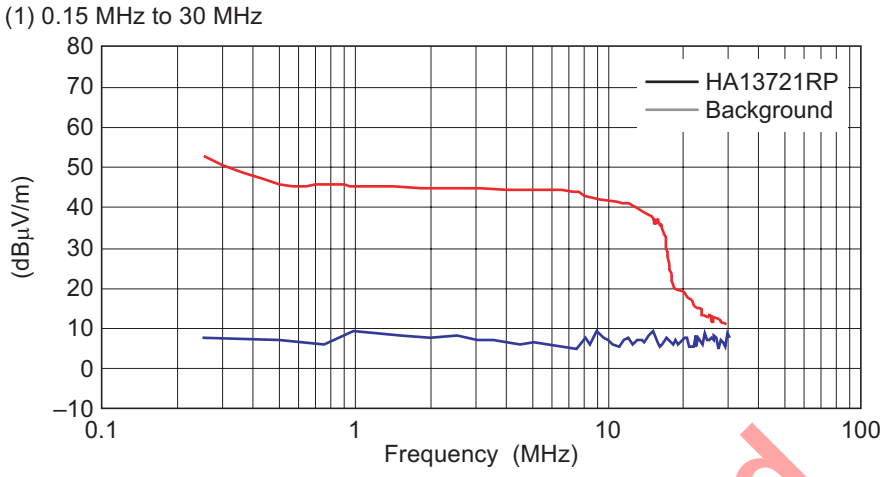
Test Circuit

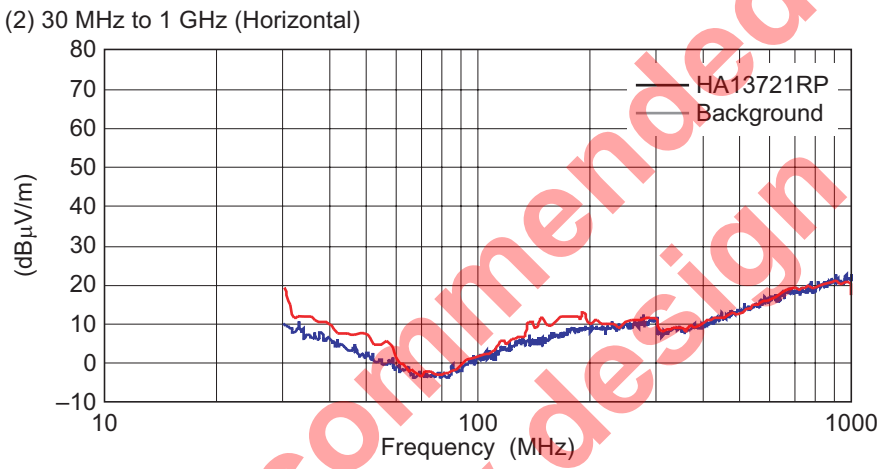


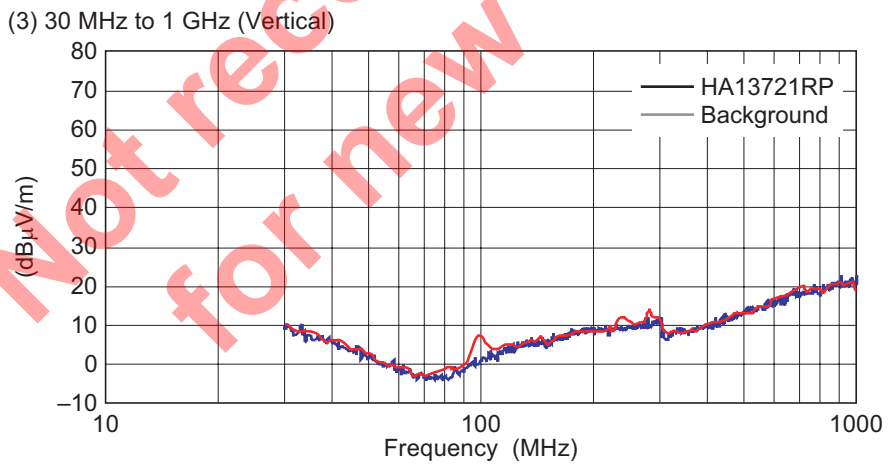
Application Example



Reference Data (Emission Noise Characteristic)







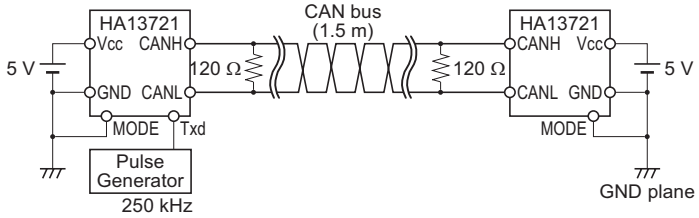
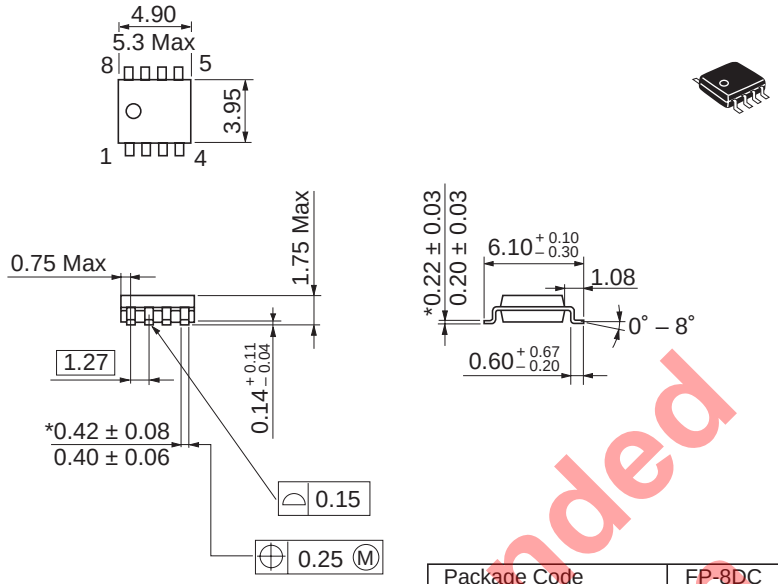


Figure 2 Test Circuit

Package Dimensions

As of January, 2003

Unit: mm

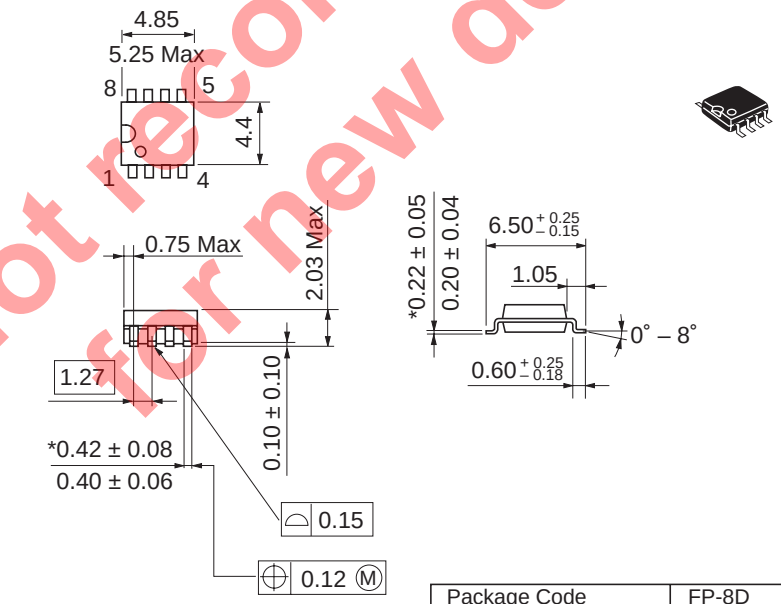


Package Code	FP-8DC
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.085 g

*Dimension including the plating thickness
Base material dimension

As of January, 2003

Unit: mm



Package Code	FP-8D
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.10 g

*Dimension including the plating thickness
Base material dimension

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