



# 3 V, SUPER MINIMOLD SI MMIC DOWNCONVERTER

## UPC2757TB UPC2758TB

### FEATURES

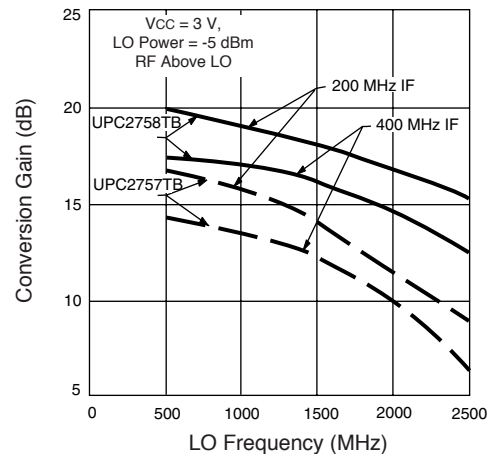
- **HIGH-DENSITY SURFACE MOUNTING:**  
6 pin super minimold or SOT-363 package
- **WIDEBAND OPERATION:**  
RF = 0.1 GHz to 2.0 GHz  
IF = 20 MHz to 300 MHz
- **BUILT-IN POWER SAVE FUNCTION**
- **SUPPLY VOLTAGE:**  $V_{CC} = 2.7$  TO  $3.3$  V

### DESCRIPTION

NEC's UPC2757TB and UPC2758TB are silicon RFICs manufactured using the NESAT™ III process. The devices consist of a mixer, an IF amplifier and an LO buffer amplifier. These devices are suitable as 1st IF downconverters for the receiver stage of cellular and other wireless systems. The UPC2757TB is designed for low power consumption while the UPC2758TB is designed for low distortion. The UPC2757TB/58TB are pin compatible and have comparable performance to the larger UPC2757T/58T, so they are suitable for use as a replacement to help reduce system size. The IC is housed in a 6 pin super minimold or SOT-363 package.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

CONVERSION GAIN vs. LO FREQUENCY



### ELECTRICAL CHARACTERISTICS (TA = 25°C, VCC = VPS = 3.0 V, PLO = -10 dBm)

PART NUMBER PACKAGE OUTLINE			UPC2757TB S06			UPC2758TB S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
ICC	Circuit Current, VPS = 3 V VPS = 0.5 V	mA μA	3.7	5.6 0.1	7.7	6.6	11 0.1	14.8
fRF	RF Operating Frequency Range (The conversion gain at fRF is not more than 3 dB down from the gain at fRF = 800 MHz, fIF = 130 MHz)	GHz	0.1		2.0	0.1		2.0
fIF	IF Operating Frequency Range (The conversion gain at fIF is not more than 3 dB down from the gain at fRF = 800 MHz, fIF = 130 MHz)	MHz	20		300	20		300
CG	Conversion Gain <sup>1</sup> , fRF = 800 MHz, fIF = 130 MHz fRF = 2.0 GHz, fIF = 250 MHz	dB dB	12 10	15 13	18 16	16 14	19 17	22 20
NF	Noise Figure, SSB fRF = 800 MHz, fIF = 130 MHz fRF = 2.0 GHz, fIF = 250 MHz	dB dB		10 13	13 16		9 13	12 15
PSAT	Saturated Output Power <sup>2</sup> , fRF = 800 MHz, fIF = 100 MHz fRF = 2.0 GHz, fIF = 250 MHz	dBm dBm	-11 -11	-3 -8		-7 -7	+1 -4	
P1dB	Output Power at 1dB compression point fRF = 800 MHz fIF = 100 MHz	dBm		-8			-3.5	
OIP3	Output 3rd Order Intercept Point, (SSB) PLO = -10 dBm fRF = 0.8~2.0 GHz, fIF = 100 MHz	dBm		+5			+11	
ISOL	LO Leakage, fLO = 0.8 ~2.0 GHz	at RF pin dBm at IF pin dBm		-35 -23			-30 -15	
RTH (J-A)	Thermal Resistance (Junction to Ambient) Mounted on a 50 x 50 x 1.6 mm epoxy glass PWB	°C/W			325			325

Notes:

1. PRF = -40 dBm.
2. PRF = -10 dBm.

# UPC2757TB, UPC2758TB

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub> , V <sub>PS</sub>	Supply Voltage	V	5.5
P <sub>T</sub>	Total Power Dissipation <sup>2</sup>	mW	200
T <sub>OP</sub>	Operating Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-55 to +150

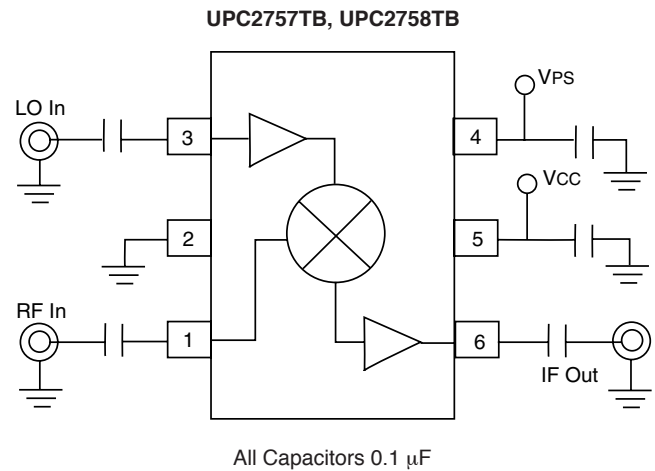
### Notes:

- Operation in excess of any one of these parameters may result in permanent damage.
- Mounted on a 50 x 50 x 1.6 mm epoxy glass PWB (T<sub>A</sub> = +85°C).

## RECOMMENDED OPERATING CONDITIONS

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V <sub>CC</sub>	Supply Voltage	V	2.7	3.0	3.3
T <sub>OP</sub>	Operating Temperature	°C	-40	+25	+85
P <sub>LO</sub>	LO Input Level	dBm	-15	-10	0

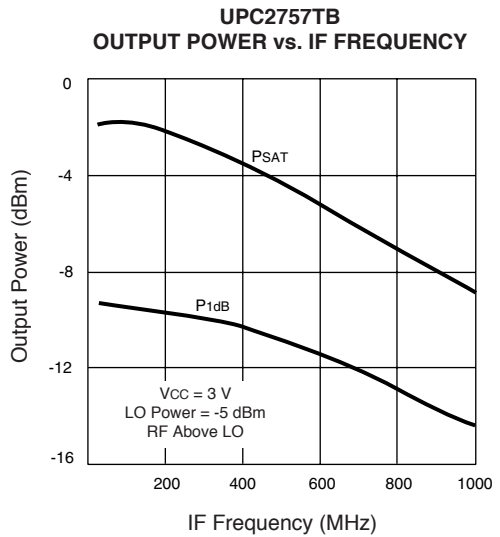
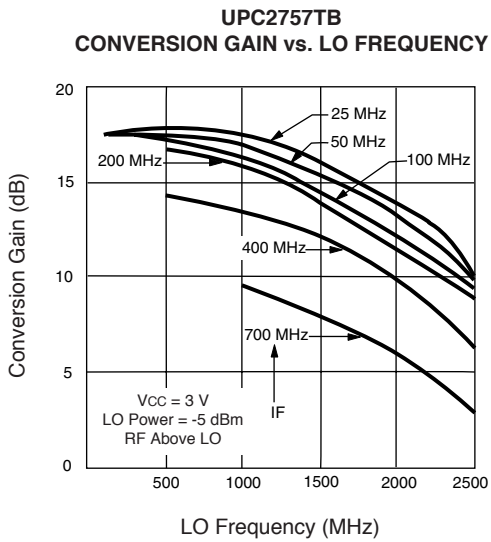
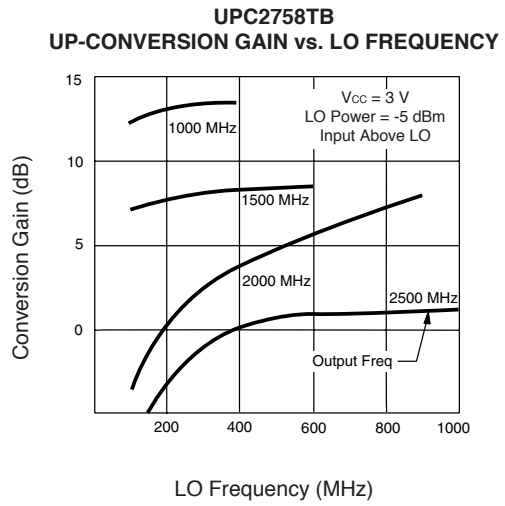
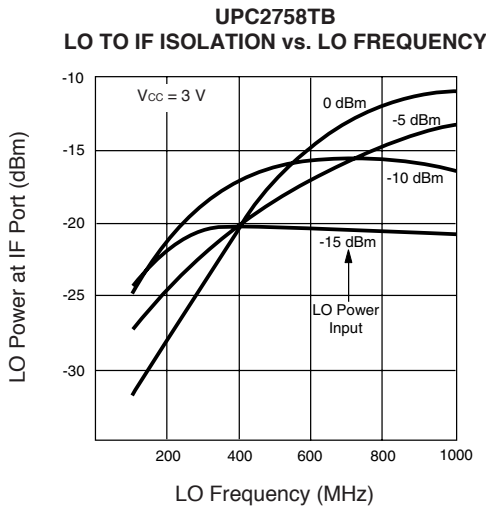
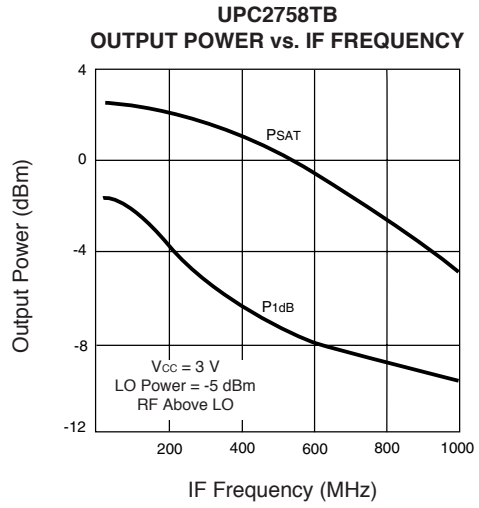
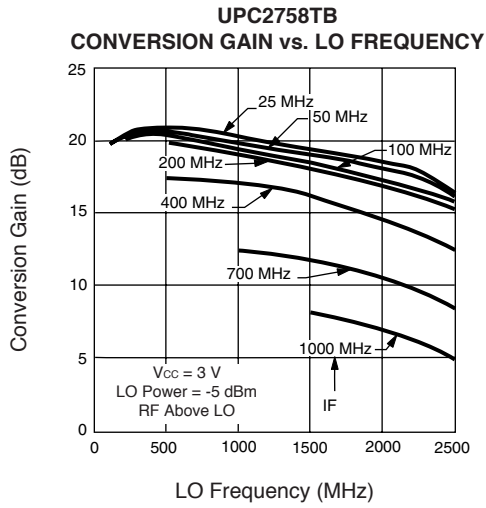
## TEST CIRCUIT/BLOCK DIAGRAM



## PIN DESCRIPTION

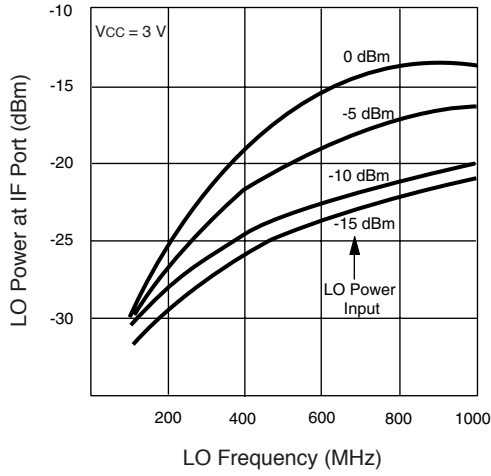
Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V)	Description	Internal Equivalent Circuit						
1	RFIN	—	1.2	Signal input pin to double balanced mixer. This pin must be coupled to the signal source with a blocking capacitor.							
2	GND	0	—	Ground pin. This pin should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible.							
3	LOIN	—	1.3	LO input pin. The LO buffer is designed as a differential amplifier. Recommended input level is -15 to 0 dBm.							
4	VPS	VCC / GND	—	Power save control pin can control the On/Sleep state with bias as follows: <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>V<sub>PS</sub> (V)</th> <th>STATE</th> </tr> </thead> <tbody> <tr> <td>≥2.5</td> <td>ON</td> </tr> <tr> <td>0 to 0.5</td> <td>SLEEP</td> </tr> </tbody> </table> Rise time/fall time using this pin is approximately 10 μs.	V <sub>PS</sub> (V)	STATE	≥2.5	ON	0 to 0.5	SLEEP	
V <sub>PS</sub> (V)	STATE										
≥2.5	ON										
0 to 0.5	SLEEP										
5	VCC	2.7 to 3.3	—	Power supply pin. This pin should be externally equipped with a bypass capacitor to minimize ground impedance.							
6	IFOUT	—	1.7	Output of single-ended push-pull IF buffer amplifier. This is an emitter-follower output with low impedance. This pin must be coupled to the next stage with a blocking capacitor.							

TYPICAL PERFORMANCE CURVES (TA = 25°C)

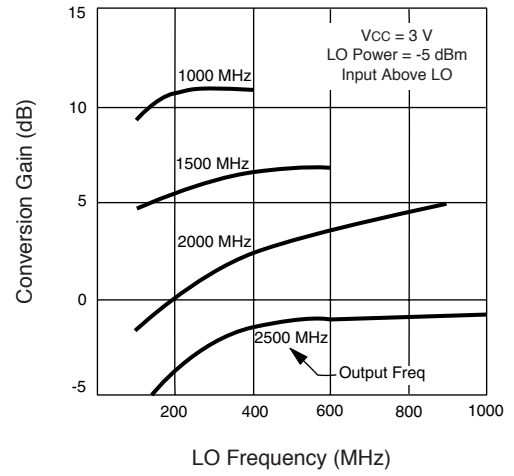


TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25°C)

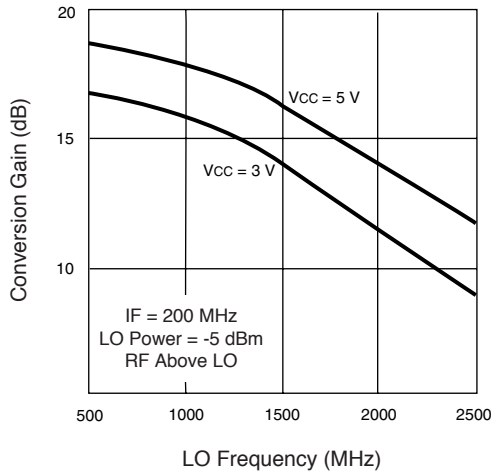
**UPC2757TB**  
LO TO IF ISOLATION vs. LO FREQUENCY



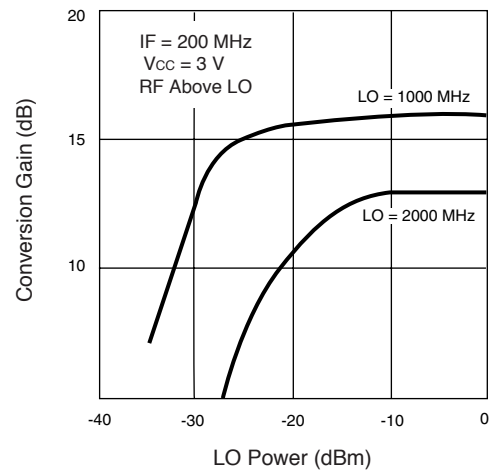
**UPC2757TB**  
UP-CONVERSION GAIN vs. LO FREQUENCY



**UPC2757TB**  
CONVERSION GAIN vs. LO FREQUENCY

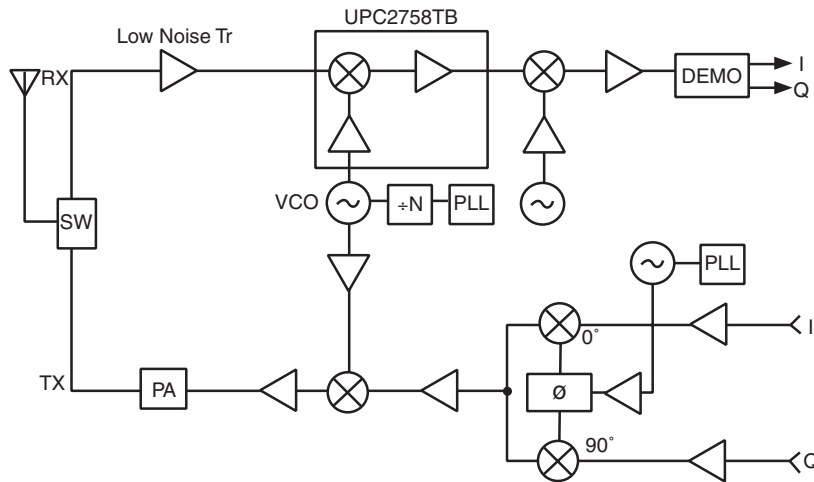


**UPC2757TB**  
CONVERSION GAIN vs. LO POWER



## APPLICATION EXAMPLE

### Digital Cellular Telephone

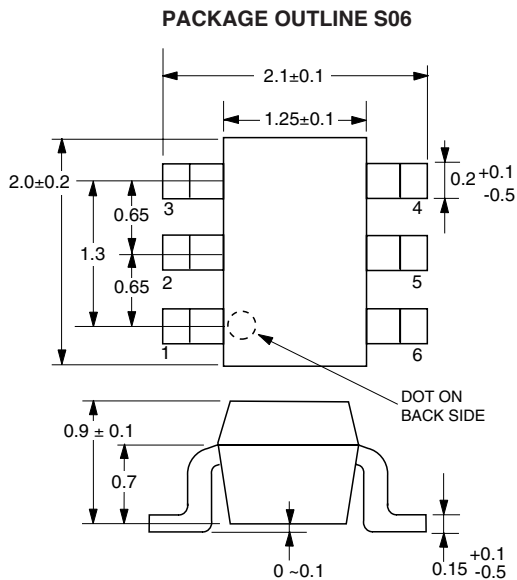


## ORDERING INFORMATION

PART NUMBER	QTY
UPC2757TB-E3-A	3K/Reel
UPC2758TB-E3-A	3K/Reel

Note:  
Embossed Tape, 8 mm wide,  
Pins 1, 2, 3 are in tape pull-out direction.

## OUTLINE DIMENSIONS

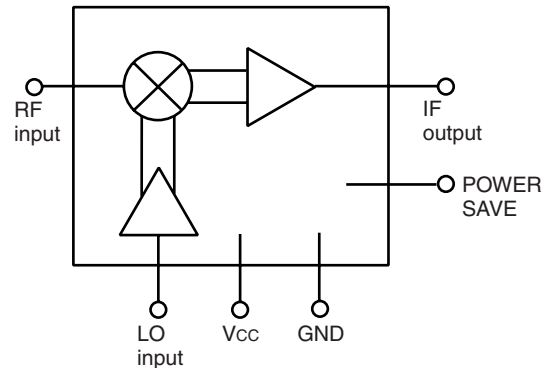


Note:  
All dimensions are typical unless otherwise specified.

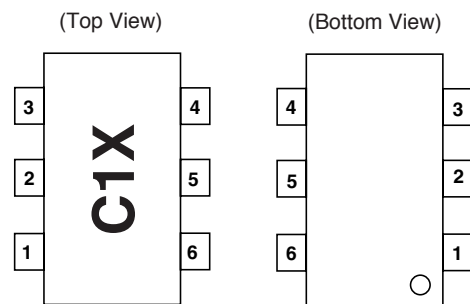
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## INTERNAL BLOCK DIAGRAM



## LEAD CONNECTIONS



1. RF INPUT
2. GND
3. LO INPUT
4. PS
5. Vcc
6. IF OUTPUT

Note:  
Package Markings:  
C1X: UPC2757TB  
C1Y: UPC2758TB

EXCLUSIVE NORTH AMERICAN AGENT FOR NEC RF, MICROWAVE & OPTOELECTRONIC SEMICONDUCTORS

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10/24/2001

Subject: Compliance with EU Directives

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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