

NARROW BAND FM IF AMPLIFIER

FEATURES

- Low Voltage Operation
- Two Stage IF Limiter
- Mixer
- Adjustable Internal Regulator

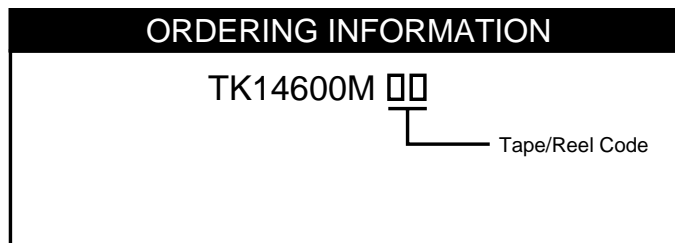
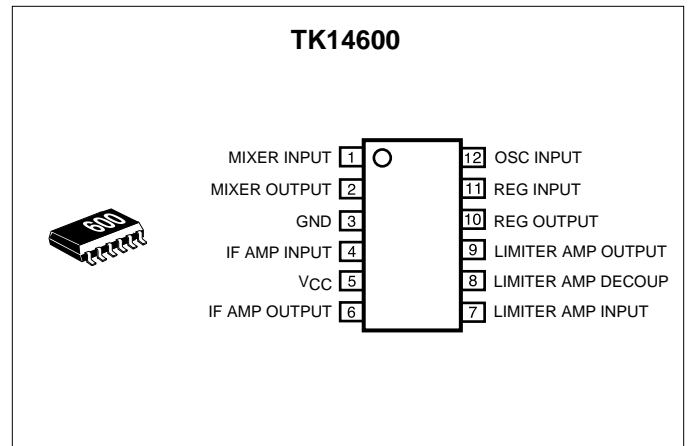
APPLICATIONS

- GPS Systems
- Digital Communications

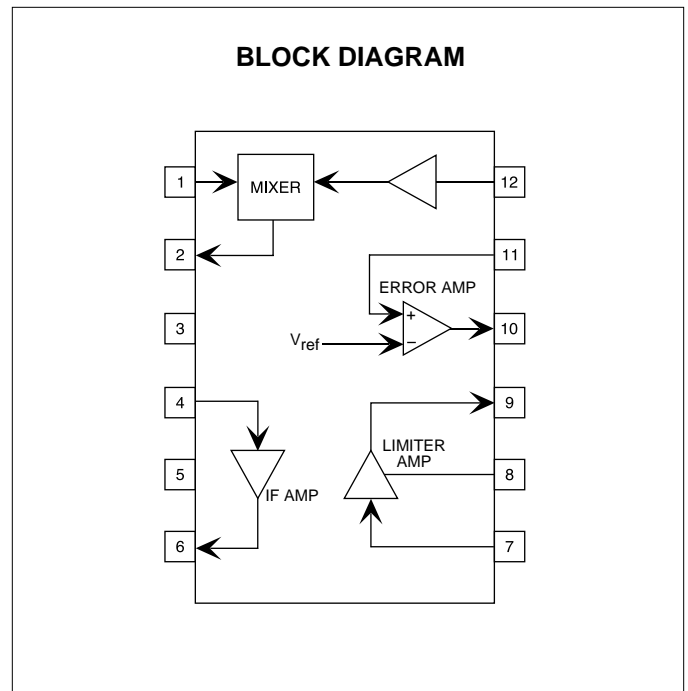
DESCRIPTION

The TK14600 is a low operating voltage FM IF system designed for use in GPS receivers and other digital communications systems. This IC contains a high gain 2-stage IF limiter with an internal voltage regulator.

The TK14600 is available in the SSOP-12 (MFP-12) surface mount package.



TAPE/REEL CODE
 BX: Bulk/Bag
 TL: Tape Left
 MG: Magazine



TK14600

ABSOLUTE MAXIMUM RATINGS

Maximum Supply Voltage	6 V	Lead Soldering Temp. (10 sec.)	235 °C
Operating Voltage Range	2.3 to 5.5 V	Storage Temperature Range	-55 to +150 °C
Junction Temperature	150 °C	Operating Temperature Range	-30 to +80 °C
Power Dissipation (Note 1)	250 mW		

TK14600 ELECTRICAL CHARACTERISTICS

Test Conditions: $V_{CC} = 3\text{ V}$, $F_{RF} = 20\text{ MHz}$, $F_{OSC} = 18.9\text{ MHz}$, Injection Level = -5dBm, $F_{IF} = 1.1\text{ MHz}$

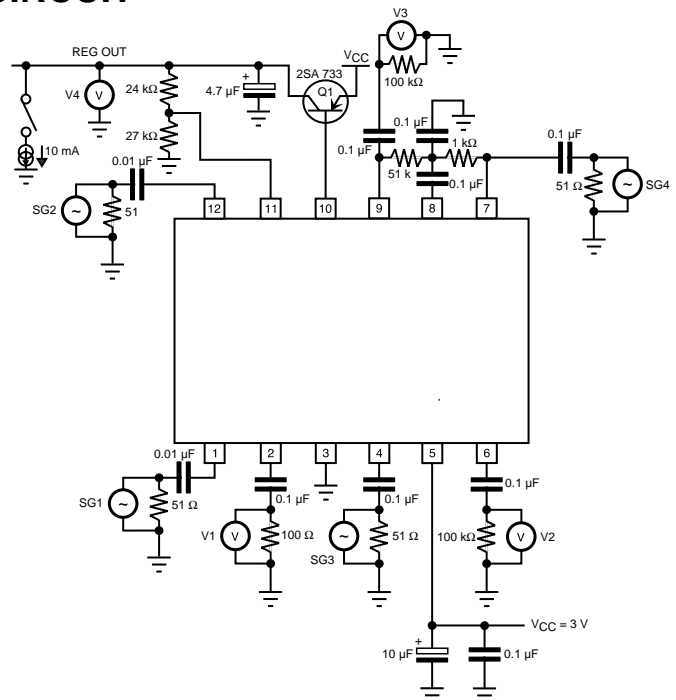
SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC}	Supply Current	No input	2.0	2.7	3.4	mA
GM	Mixer Transfer Gain	$f_{RF} = 20.0\text{ MHz}$, 50 dB μ input $f_{OSC} = 18.9\text{ MHz}$, -5 dBm input	24	30	36	dB
f_{IN}	Mixer Operating Frequency Range		0.1		40	MHz
GIF1	IF Amp Gain	40 dB μ input, $f_{IF} = 1.1\text{ MHz}$	24	30	36	dB
V_{OUT1}	IF Amp Output Voltage	80 dB μ input, $f_{IF} = 1.1\text{ MHz}$	0.22	0.33	0.44	V_{P-P}
GIF2	Limiter Amp Gain	20 dB μ input, $f_{IF} = 1.1\text{ MHz}$	65	75	85	dB
V_{OUT2}	Limiter Amp Output Voltage	80 dB μ input, $f_{IF} = 1.1\text{ MHz}$	0.6	1.0	1.4	V_{P-P}
f_{IF}	IF Amp, Limiter Amp Operating Frequency Range		0.1		5	MHz
V_R	Voltage Regulator Output	$I_{OUT} = 10\text{ mA}$	1.8	2.0	2.2	V

Note 1: Power dissipation is 250 mW in free air. Derate at 2.0 mW/°C for operation above 25 °C.

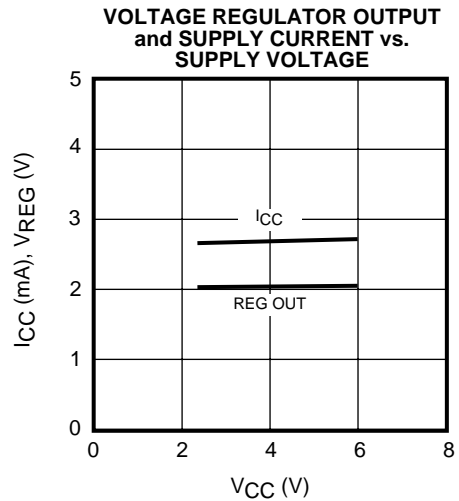
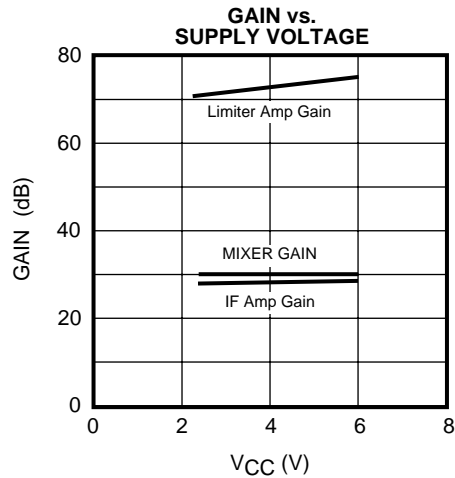
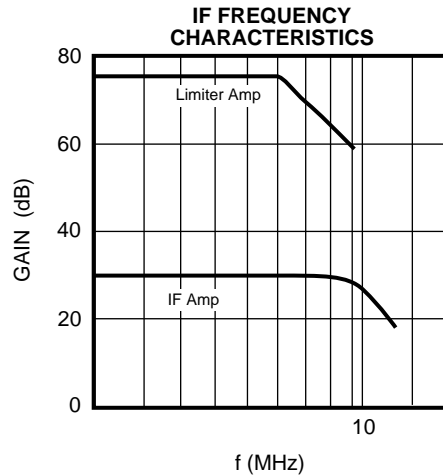
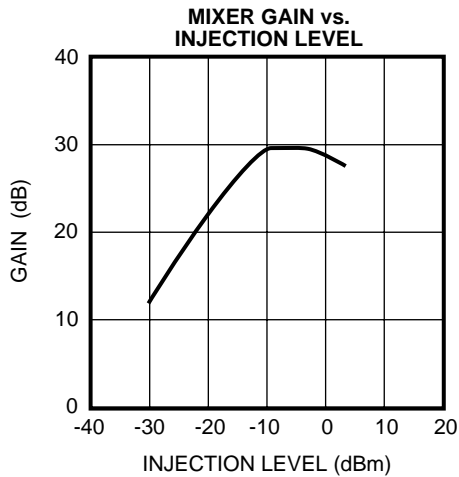
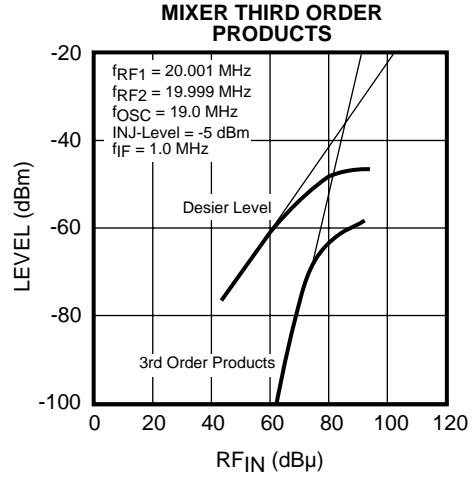
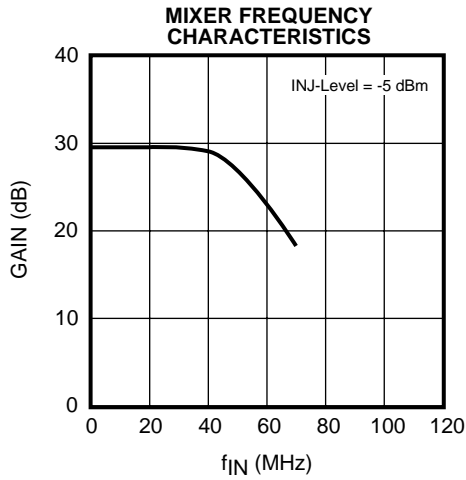
TEST CIRCUIT

Test Conditions: $V_{CC} = 3\text{ V}$, $T_A = 25\text{ °C}$

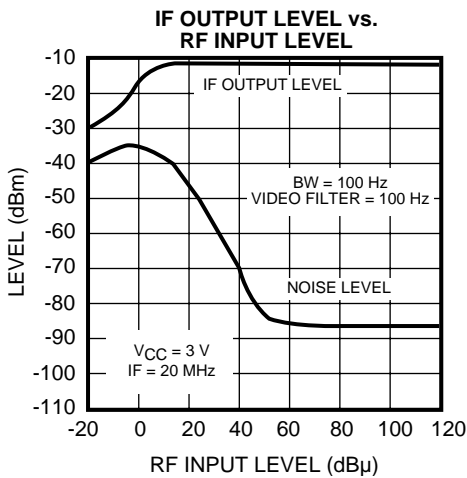
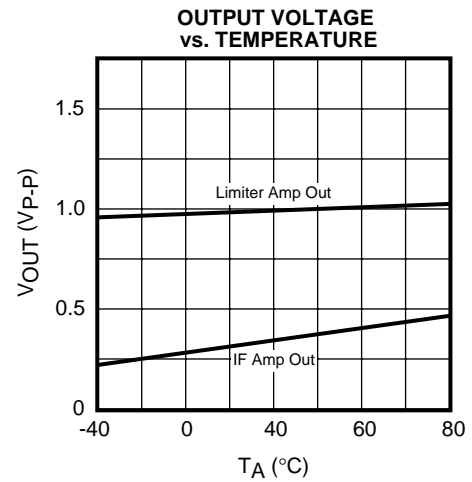
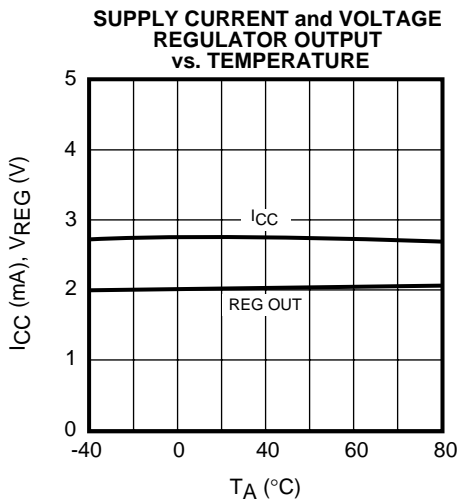
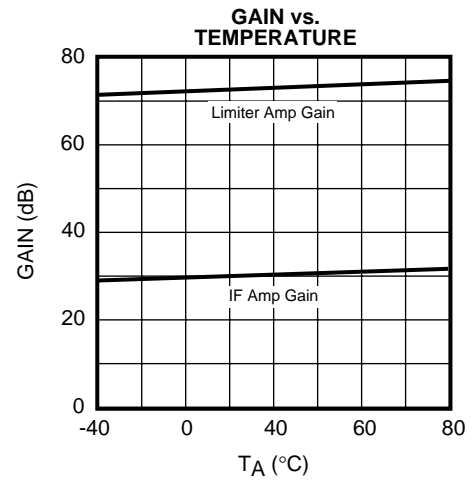
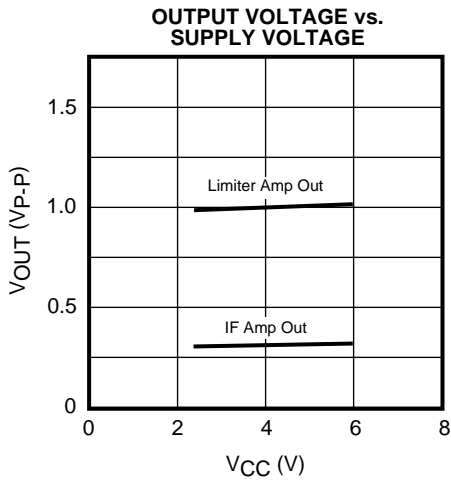
Mixer	SG1 (RF Input)	20 MHz Non-mod
	SG2 (Local Input)	18.9 MHz Non-mod
	V1 (IF Output)	1.1 MHz
IF Amp	SG3 (IF1 Input)	1.1 MHz Non-mod
	V2 (IF1 Output)	
Limiter Amp	SG4 (IF2 Input)	1.1 MHz Non-mod
	V3 (IF2 Output)	
Regulator	V4 (Regulator Output)	



TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)



PIN FUNCTION DESCRIPTION
 $V_{CC} = 3\text{ V}$, $f_{RF} = 20\text{ MHz}$, $f_{OSC} = 19\text{ MHz}$, Injection Level: -3 dBm , $f_{IF} = 1\text{ MHz}$

PIN NO.	SYMBOL	VOLTAGE	INTERNAL EQUIVALENT CIRCUIT	DESCRIPTION
1	MIXER INPUT	0.95 V		<p>Mixer RF Input Pin</p> <p>The operating frequency range is up to 40 MHz. This pin is internally terminated with a 3 kΩ resistor.</p>
2	MIXER OUTPUT	2.0 V		<p>Mixer Output Pin</p> <p>The output impedance is 1 kΩ.</p>
3	GND			GND Pin
4	IF AMP INPUT	2.3 V		<p>IF Amplifier Input Pin.</p> <p>The input impedance is 1 kΩ. The voltage gain is approximately 28 dB. The IF amplifier frequency range is up to 3 MHz.</p>
5	V_{CC}			<p>Power Supply Pin.</p> <p>The supply voltage range is 2.3 to 5.5 V.</p>
6	IF AMP OUTPUT	2.05 V		<p>IF Amplifier Output</p> <p>The output impedance is 1 kΩ. The typical level is 300 mV_{P-P}.</p>

PIN FUNCTION DESCRIPTION

$V_{CC} = 3\text{ V}$, $f_{RF} = 20\text{ MHz}$, $f_{OSC} = 19\text{ MHz}$, Injection Level: -3 dBm , $f_{IF} = 1\text{ MHz}$

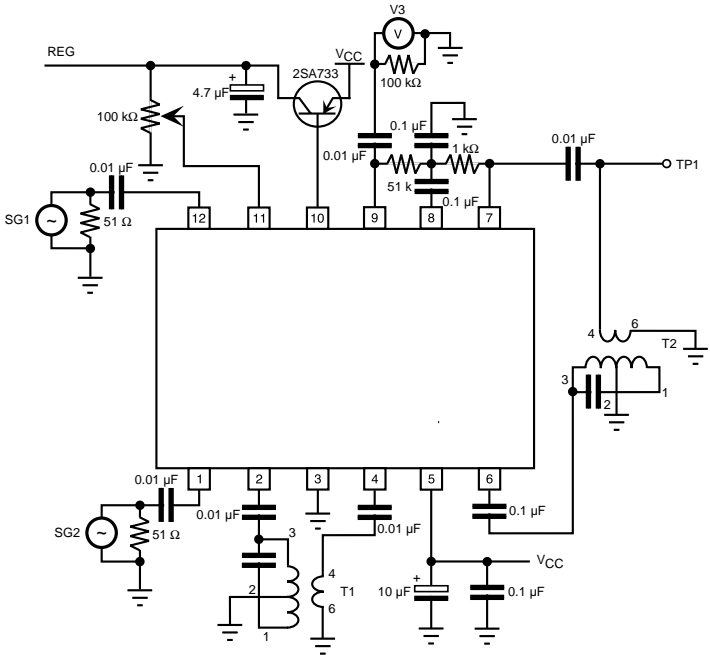
PIN NO.	SYMBOL	VOLTAGE	INTERNAL EQUIVALENT CIRCUIT	DESCRIPTION
7	LIMITER AMP INPUT	1.85 V		<p>Limiter Amplifier Input Pin.</p> <p>The input impedance is $1\text{ k}\Omega$. The gain of this stage is approximately 70 dB. The limiter frequency range is up to 3 MHz.</p>
8	LIMITER AMP DECOUPLING	1.78 V		<p>Limiter Amplifier Decoupling Pin.</p> <p>A $0.1\text{ }\mu\text{F}$ decoupling capacitor is connected to this pin.</p>
9	LIMITER AMP OUTPUT	1.89 V		<p>Limiter Amplifier Output Pin.</p> <p>The output impedance is approximately $200\text{ }\Omega$. The typical output level is 1 V_{P-P}. This value is suitable for CMOS interface.</p>
10	REGULATOR OUTPUT			<p>Regulator Control Output Pin.</p> <p>This pin is the regulator's error amplifier output pin. This pin drives the external PNP transistor base.</p>

PIN FUNCTION DESCRIPTION

$V_{CC} = 3\text{ V}$, $f_{RF} = 20\text{ MHz}$, $f_{OSC} = 19\text{ MHz}$, Injection Level: -3 dB , $f_{IF} = 1\text{ MHz}$

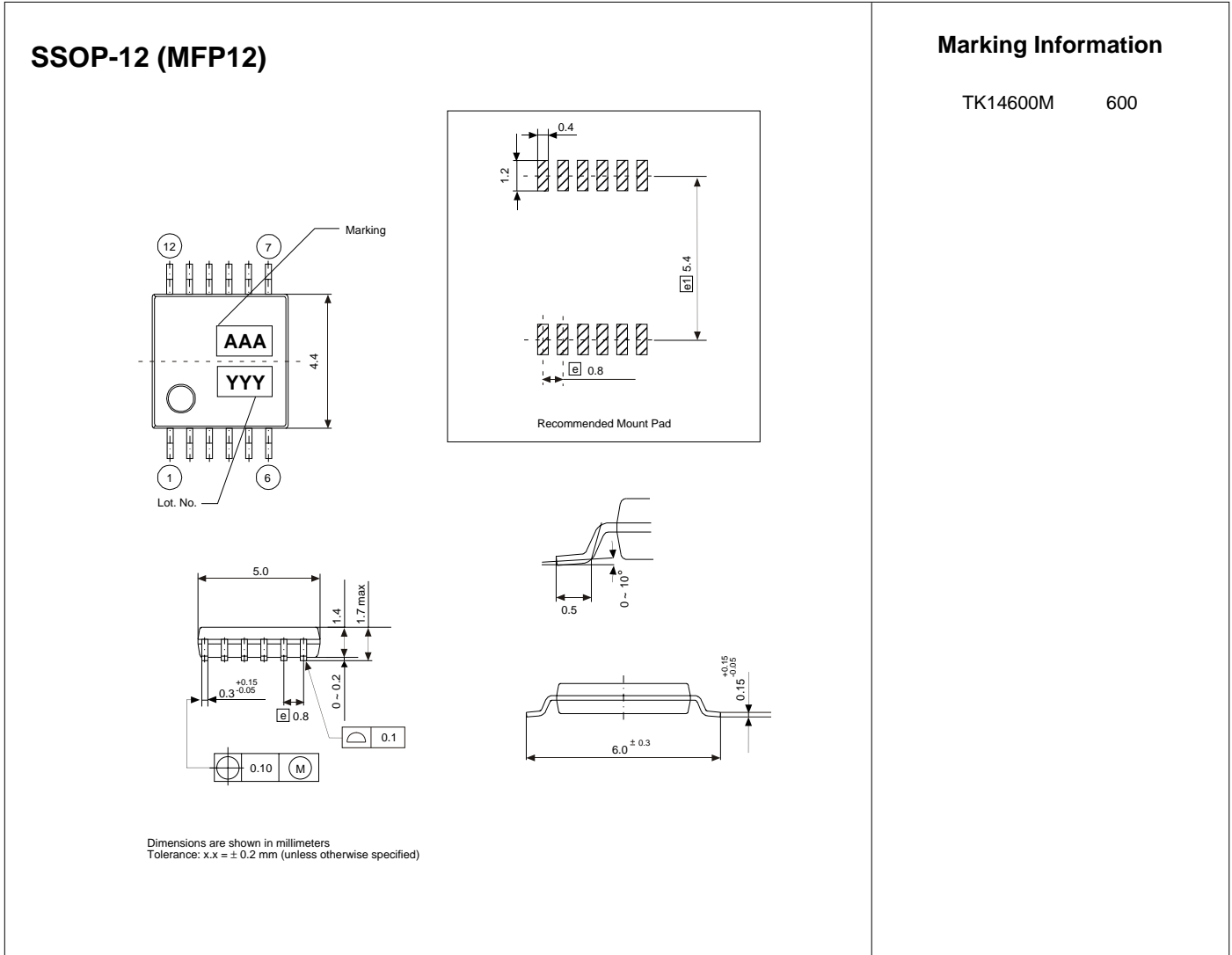
PIN NO.	SYMBOL	VOLTAGE	INTERNAL EQUIVALENT CIRCUIT	DESCRIPTION
11	REGULATOR INPUT			<p>Error Amplifier Input Pin.</p> <p>The reference voltage of the error amplifier is approximately 1 V. Therefore, the regulator's output voltage is determined as follows: $V_{OUT} = 1.0 \times (R1 + R2)/R2$</p>
12	OSC INPUT	2.98 V		Local Oscillator Input Pin

APPLICATION CIRCUIT



- Conditions: $V_{CC} = 3\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$
- RF Input Frequency: 20.1 MHz
 - Local Input Frequency: 19.0 MHz, Inj. Level -5 dBm
 - IF Frequency: 1.1 MHz
 - V_{CC} : 3.0 V
 - IF Coil Application (T1, T2)**
 - TOKO Part Number: A7LCS-12434N
 - Center Frequency: 1.1 MHz
 - Internal Capacitor: 180 pF
 - Unloaded Q: Above 80
 - Winding: (1-3) 64T., (2-3) 11T., (4-6) 11T.
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