TEF6606

Advanced tuner on main-board IC

Rev. 01.03 — 12 June 2007 Objective data sheet

1. General description

The TEF6606 is an AM/FM radio including Phase-Locked Loop (PLL) tuning system. The system is designed in such a way, that it can be used as a world-wide tuner covering common FM and AM bands for radio reception. All functions are controlled by the I^{2}C-bus. Besides the basic feature set it provides a good weak signal processing function and a dynamic bandwidth control at FM reception.

2. Features

- FM tuner for Japan, Europe, US and OIRT reception
- AM tuner for Long Wave (LW), Medium Wave (MW) and Short Wave (SW) reception
- Integrated AM Radio Frequency (RF) selectivity
- Integrated PLL tuning system; controlled via I^{2}C-bus including automatic low/high side Local Oscillator (LO) injection
- Fully integrated LO
- No alignment needed
- Very easy application on the main board
- No critical RF components
- Fully integrated Intermediate Frequency (IF) filters and FM stereo decoder
- Fully integrated FM noise blanker
- Fully integrated AM audio noise blanker
- Field strength (LEVEL), multipath [Wideband AM (WAM)], noise [UltraSonic Noise (USN)] and deviation dependent stereo blend
- Field strength (LEVEL), multipath (WAM), noise (USN) and deviation dependent High-Cut Control (HCC)
- Field strength (LEVEL), multipath (WAM) and noise (USN) dependent soft mute
- Adjacent channel and deviation dependent IF bandwidth control [Precision Adjacent Channel Suppression (PACS)]
- Single power supply
- Qualified in accordance with AEC-Q100

founded by Philips

3. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage	on pins V_{CC1} and V_{CC2}	8	8.5	9	V
I_{CC}	supply current	into pins V_{CC1}, V_{CC2} and VREGSUP				
		FM	90	120	140	mA
		AM	100	134	150	mA
FM path						
f_{RF}	RF frequency	FM tuning range	65	-	108	MHz
$V_{i(sens)}$	input sensitivity voltage	(S+N)/N = 26 dB; including weak signal handling	-	5	-	dBµV
(S+N)/N	signal plus noise-to-noise ratio	$V_{i(RF)}$ = 1 mV; Δf = 22.5 kHz	55	60	-	dB
THD	total harmonic distortion	mono; Δf = 75 kHz; $V_{i(RF)}$ = 1 mV	-	0.4	0.8	%
α_{image}	image rejection	$f_{RF(image)} = f_{RF(wanted)} \pm 2 \times f_{IF}$	50	60	-	dB
α_{cs}	channel separation	$V_{i(RF)}$ = 1 mV; data byte Fh bits CHSEP[2:0] = 100	26	40	-	dB
AM path						
f_{RF}	RF frequency	tuning range				
		AM (LW) tuning range	144	-	288	kHz
		AM (MW) tuning range	522	-	1710	kHz
		AM (SW) tuning range	2.94	-	18.135	MHz
$V_{i(sens)}$	input sensitivity voltage	S/N = 26 dB; data byte 3h bits DEMP[1:0] = 10; MW	-	34	-	dBµV
(S+N)/N	signal plus noise-to-noise ratio	$V_{i(RF)}$ = 10 mV	50	56	-	dB
THD	total harmonic distortion	$V_{i(RF)}$ = 1 mV; m = 80 %	-	0.7	1	%
α_{image}	image rejection	$f_{RF(image)} = f_{RF(wanted)} \pm 2 \times f_{IF}$	45	55	-	dB

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4. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
TEF6606T	SO32	plastic small outline package; 32 leads; body width 7.5 mm	SOT287-1

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8.2.4 Write mode: data byte TUNER2

Table 26. TUNER2 - data byte 2h bit allocation with default setting

7	6	5	4	3	2	1	0
RFAGC1	RFAGC0	INJ1	INJ0	0	FMBW2	FMBW1	FMBW0
0	0	0	0		0	0	0

Table 27. TUNER2 - data byte 2h bit description

Bit	Symbol	Description
7 and 6	RFAGC[1:0]	AM RF AGC sensitivity control
		00 = AGC threshold not reduced
		01 = AGC threshold reduced by 2 dB
		10 = AGC threshold reduced by 4 dB
		11 = AGC threshold reduced by 6 dB
		FM RF AGC sensitivity control
		00 = AGC threshold reduced by 6 dB
		01 = AGC threshold reduced by 4 dB
		10 = AGC threshold reduced by 2 dB
		11 = AGC threshold not reduced
5 and 4	INJ[1:0]	injection[1]
		00 = automatic injection
		01 = high injection LO
		10 = low injection LO
		11 = undefined, do not use
3	-	not used, must be set to logic 0
2 to 0	FMBW[2:0]	FM bandwidth control
		0 = dynamic mode (optimum bandwidth is selected depending on reception conditions)
		001 to 111 = narrow to wide FM IF filter bandwidth

[1] For a correct tuning result a change in the INJ setting should always be combined with MODE[2:0] = 110 or a tuning action of MODE[2:0] = 001 to 101.

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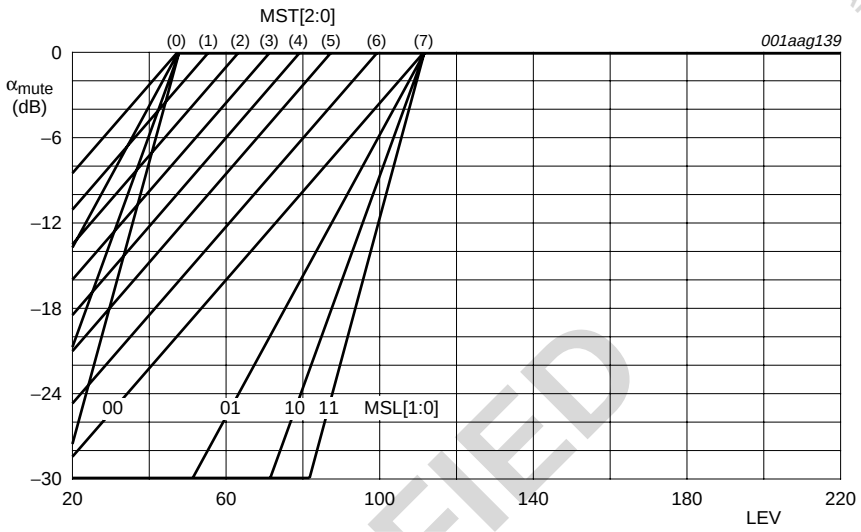

(0) MST[2:0] = 000
(1) MST[2:0] = 001
(2) MST[2:0] = 010
(3) MST[2:0] = 011
(4) MST[2:0] = 100
(5) MST[2:0] = 101
(6) MST[2:0] = 110
(7) MST[2:0] = 111

Fig 16. FM soft mute controlled by level information

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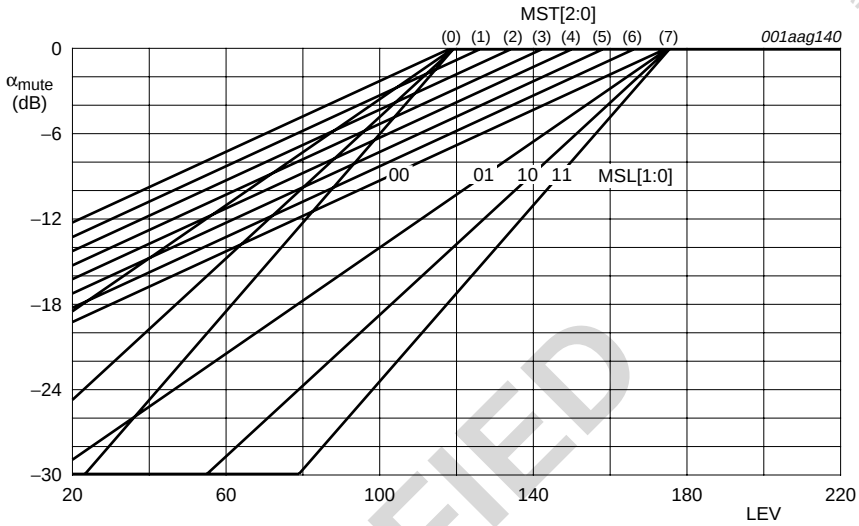

(0) MST[2:0] = 000
(1) MST[2:0] = 001
(2) MST[2:0] = 010
(3) MST[2:0] = 011
(4) MST[2:0] = 100
(5) MST[2:0] = 101
(6) MST[2:0] = 110
(7) MST[2:0] = 111

Fig 17. AM soft mute controlled by level information

8.2.8 Write mode: data byte SOFTMUTE2_FM

Table 35. SOFTMUTE2_FM - data byte 6h bit allocation with default setting

7	6	5	4	3	2	1	0
MFON	MSON	MNS1	MNS0	MFOM	MSOM	MMS1	MMS0
0	0	0	0	0	0	0	0

Table 36. SOFTMUTE2_FM - data byte 6h bit description

Bit	Symbol	Description
7	MFON	soft mute fast on noise (USN)
		0 = no fast control on noise (USN)
		1 = fast control on noise (USN) active
6	MSON	soft mute slow on noise (USN)
		0 = no slow control on noise (USN)
		1 = slow control on noise (USN) active
5 and 4	MNS[1:0]	sensitivity of soft mute on noise (USN)
		00 to 11 = weak to strong soft mute control by FM noise (USN); see Figure 18

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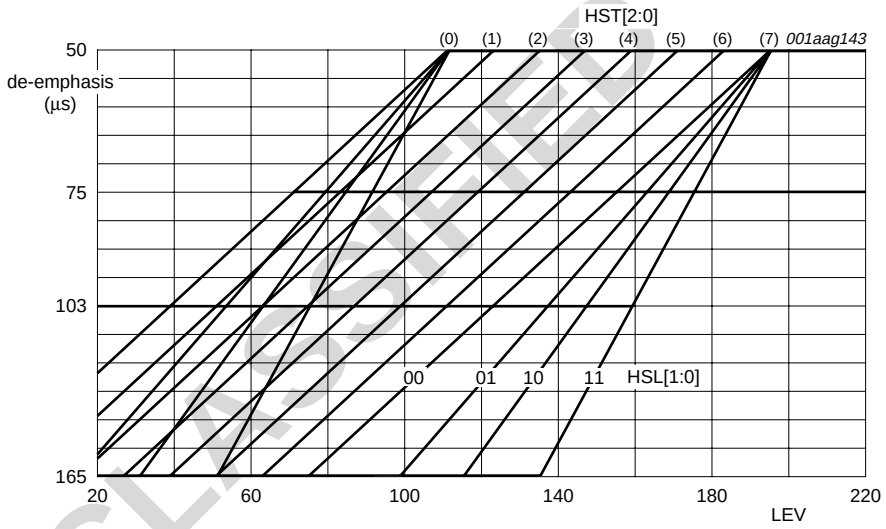
Table 43. HIGHCUT1 - data byte 8h bit description *…continued*

Bit	Symbol	Description
4 to 2	HST[2:0]	high-cut start on level
		000 to 111 = high threshold to low threshold of weak signal high-cut control; see Figure 21 and Figure 22
1 and 0	HSL[1:0]	high-cut slope on level
		00 to 11 = low steepness to high steepness of slope of weak signal high-cut control; see Figure 21 and Figure 22



(0) HST[2:0] = 000
(1) HST[2:0] = 001
(2) HST[2:0] = 010
(3) HST[2:0] = 011
(4) HST[2:0] = 100
(5) HST[2:0] = 101
(6) HST[2:0] = 110
(7) HST[2:0] = 111

Fig 21. FM high-cut controlled by level information

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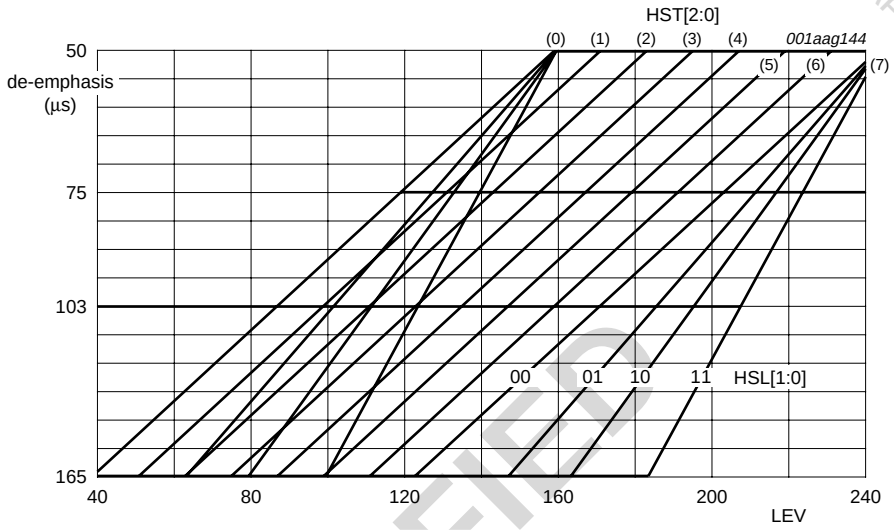

(0) HST[2:0] = 000
(1) HST[2:0] = 001
(2) HST[2:0] = 010
(3) HST[2:0] = 011
(4) HST[2:0] = 100
(5) HST[2:0] = 101
(6) HST[2:0] = 110
(7) HST[2:0] = 111

Fig 22. AM high-cut controlled by level information

8.2.12 Write mode: data byte HIGHCUT2

Table 44. HIGHCUT2 - data byte 9h bit allocation with default setting

7	6	5	4	3	2	1	0
HFON	HSON	HNS1	HNS0	HFOM	HSOM	HMS1	HMS0
0	0	0	0	0	0	0	0

Table 45. HIGHCUT2 - data byte 9h bit description

Bit	Symbol	Description
7	HFON	high-cut fast on noise (USN)
		0 = no fast control on noise (USN)
		1 = fast control on noise (USN) active
6	HSON	high-cut slow on noise (USN)
		0 = no slow control on noise (USN)
		1 = slow control on noise (USN) active
5 and 4	HNS[1:0]	sensitivity of high-cut on noise (USN)
		00 to 11 = weak to strong high-cut control by FM noise (USN); see Figure 23

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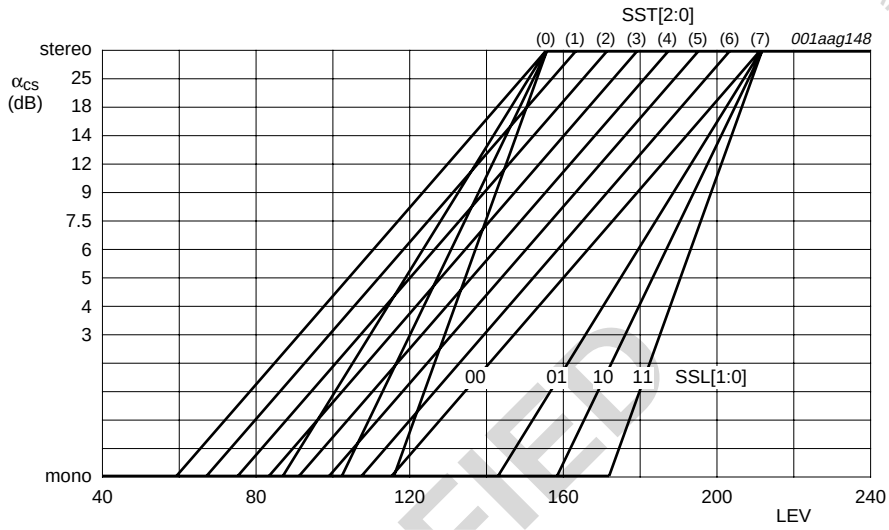

(0) SST[2:0] = 000
(1) SST[2:0] = 001
(2) SST[2:0] = 010
(3) SST[2:0] = 011
(4) SST[2:0] = 100
(5) SST[2:0] = 101
(6) SST[2:0] = 110
(7) SST[2:0] = 111

Fig 26. Stereo blend controlled by level information

8.2.15 Write mode: data byte STEREO2

Table 51. STEREO2 - data byte Ch bit allocation with default setting

7	6	5	4	3	2	1	0
SFON	SSON	SNS1	SNS0	SFOM	SSOM	SMS1	SMS0
0	0	0	0	0	0	0	0

Table 52. STEREO2 - data byte Ch bit description

Bit	Symbol	Description
7	SFON	stereo blend fast on noise (USN)
		0 = no fast control on noise (USN)
		1 = fast control on noise (USN) active
6	SSON	stereo blend slow on noise (USN)
		0 = no slow control on noise (USN)
		1 = slow control on noise (USN) active
5 and 4	SNS[1:0]	sensitivity of stereo blend on noise (USN)
		00 to 11 = weak to strong stereo blend control by FM noise (USN); see Figure 27

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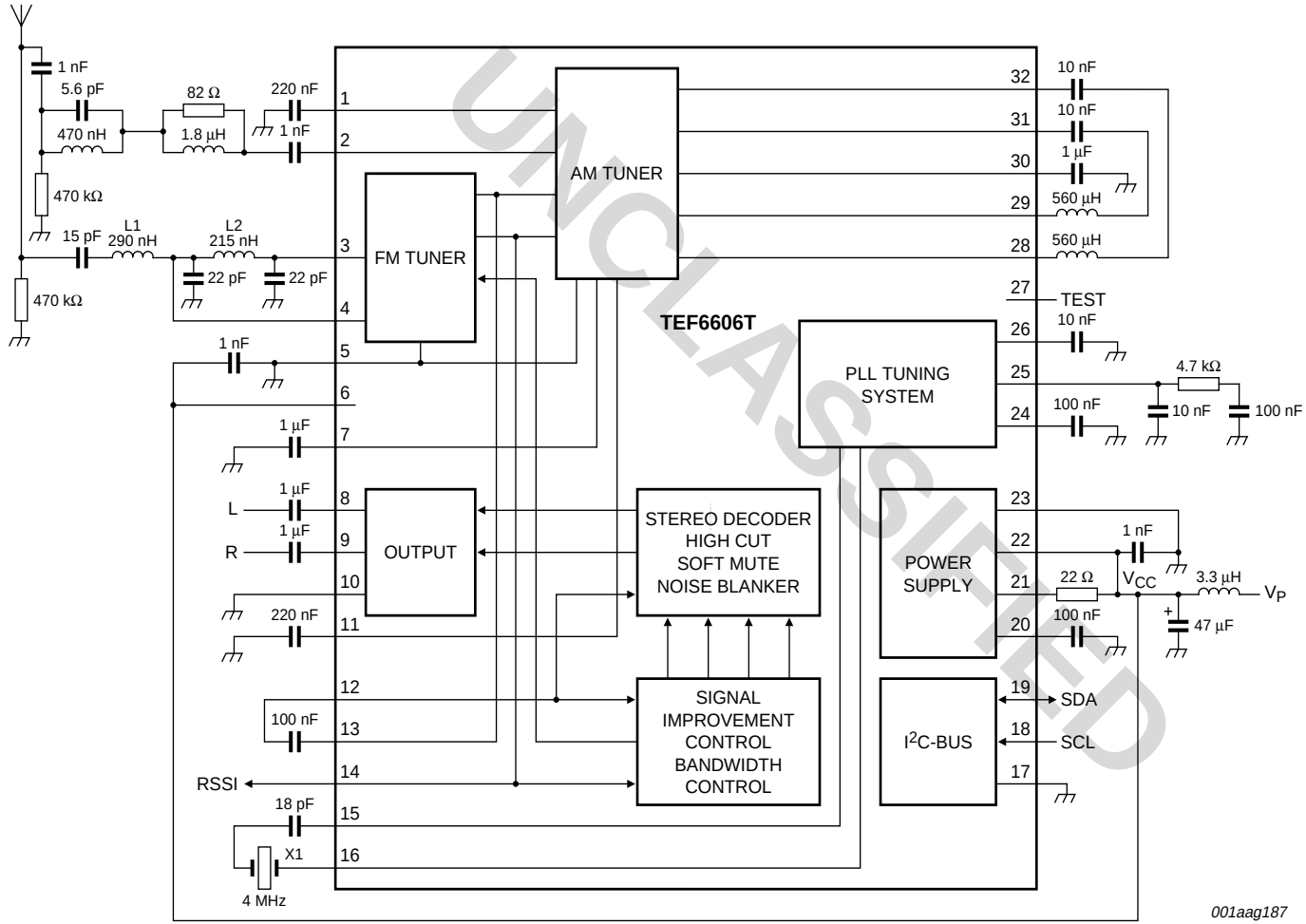
13. Application information



For list of components see Table 64.

Fig 29. Application diagram of TEF6606T

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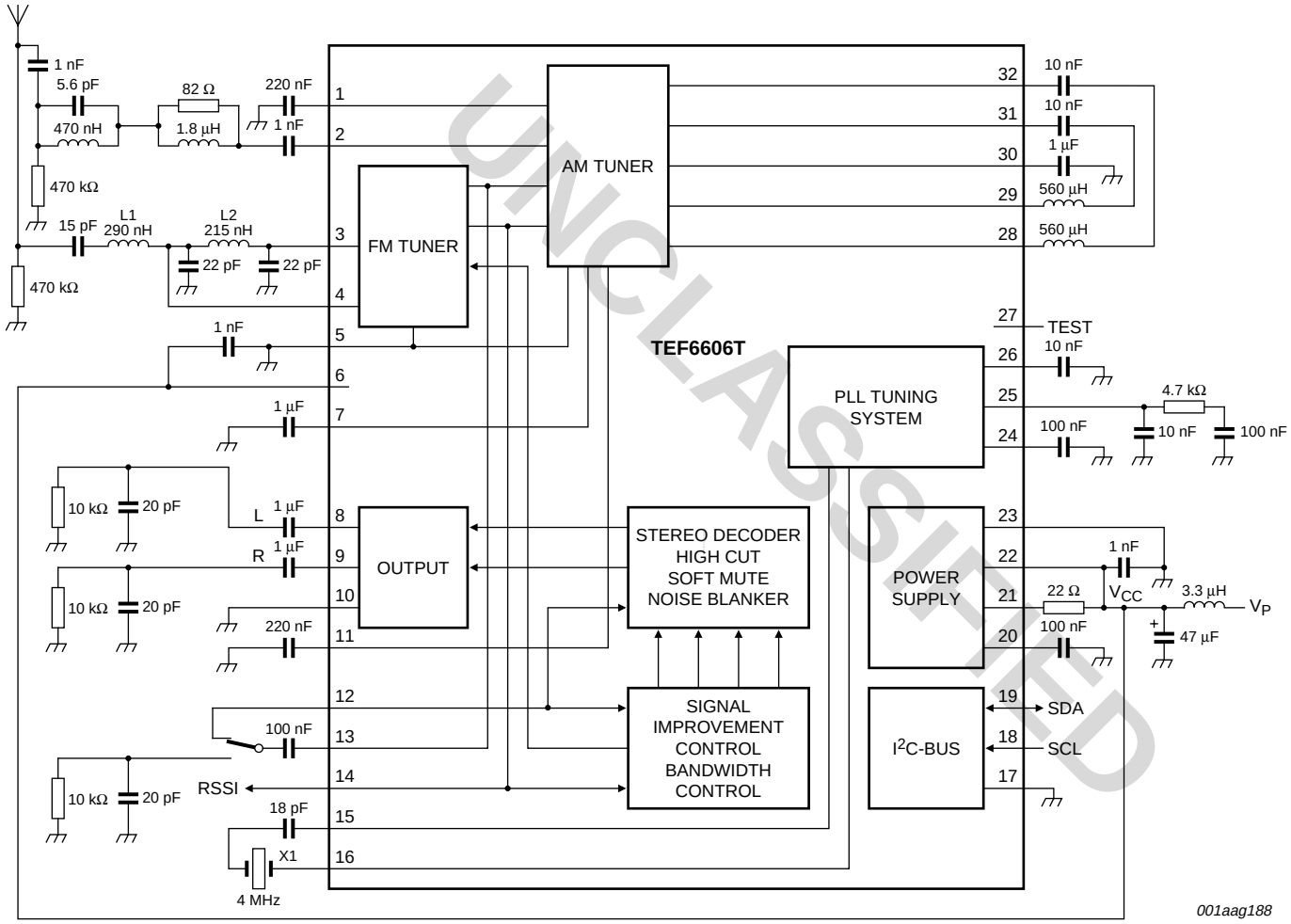
14. Test information



For list of components see Table 64.

Fig 30. Test circuit of TEF6606T

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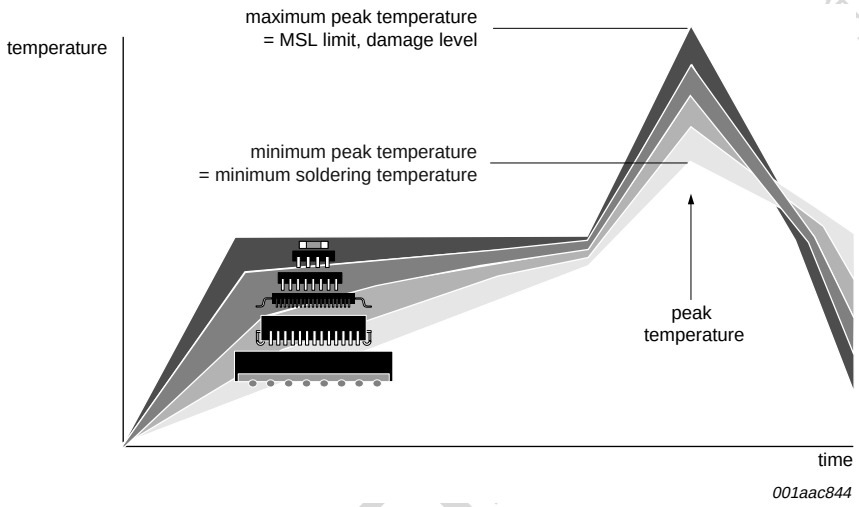

MSL: Moisture Sensitivity Level

Fig 32. Temperature profiles for large and small components

For further information on temperature profiles, refer to Application Note *AN10365 "Surface mount reflow soldering description"*.

17. Abbreviations

Table 68. Abbreviations

Acronym	Description
AGC	Automatic Gain Control
HCC	High-Cut Control
IF	Intermediate Frequency
LO	Local Oscillator
LW	Long Wave
MPX	Multiplex
MW	Medium Wave
PACS	Precision Adjacent Channel Suppression
PLL	Phase-Locked Loop
RF	Radio Frequency
RSSI	Received Signal Strength Indication
SW	Short Wave
USN	UltraSonic Noise
VCO	Voltage-Controlled Oscillator
WAM	Wideband AM

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