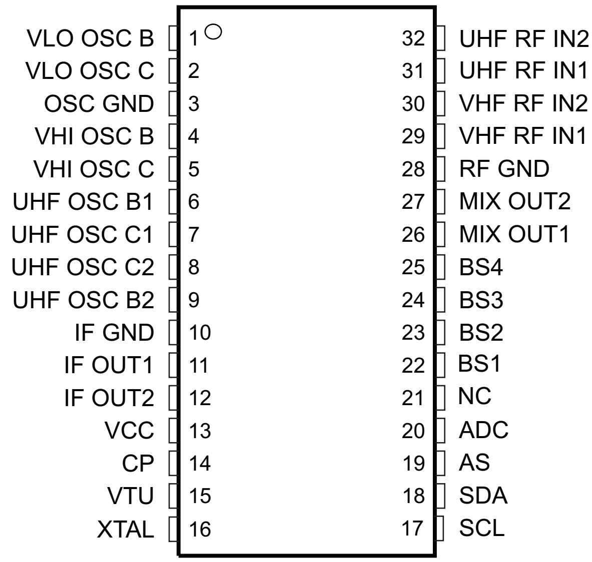
FEATURES

- Single-Chip Mixer/Oscillator and Phase-Locked Loop (PLL) Synthesizer
- Three-Band Local Oscillator and Mixer
- Inter-Integrated Circuit (I^2C) Bus Protocol (Bidirectional Data Transmission)
- 30-V Tuning-Voltage Output
- Four NPN-Type Band-Switch (BS) Drivers
- Programmable Reference Divider Ratio (512, 640, or 1024)
- 5-V Power Supply
- 32-Pin Thin Shrink Small-Outline Package (TSSOP)

TSSOP PACKAGE
(TOP VIEW)



NC – No internal connection

APPLICATIONS

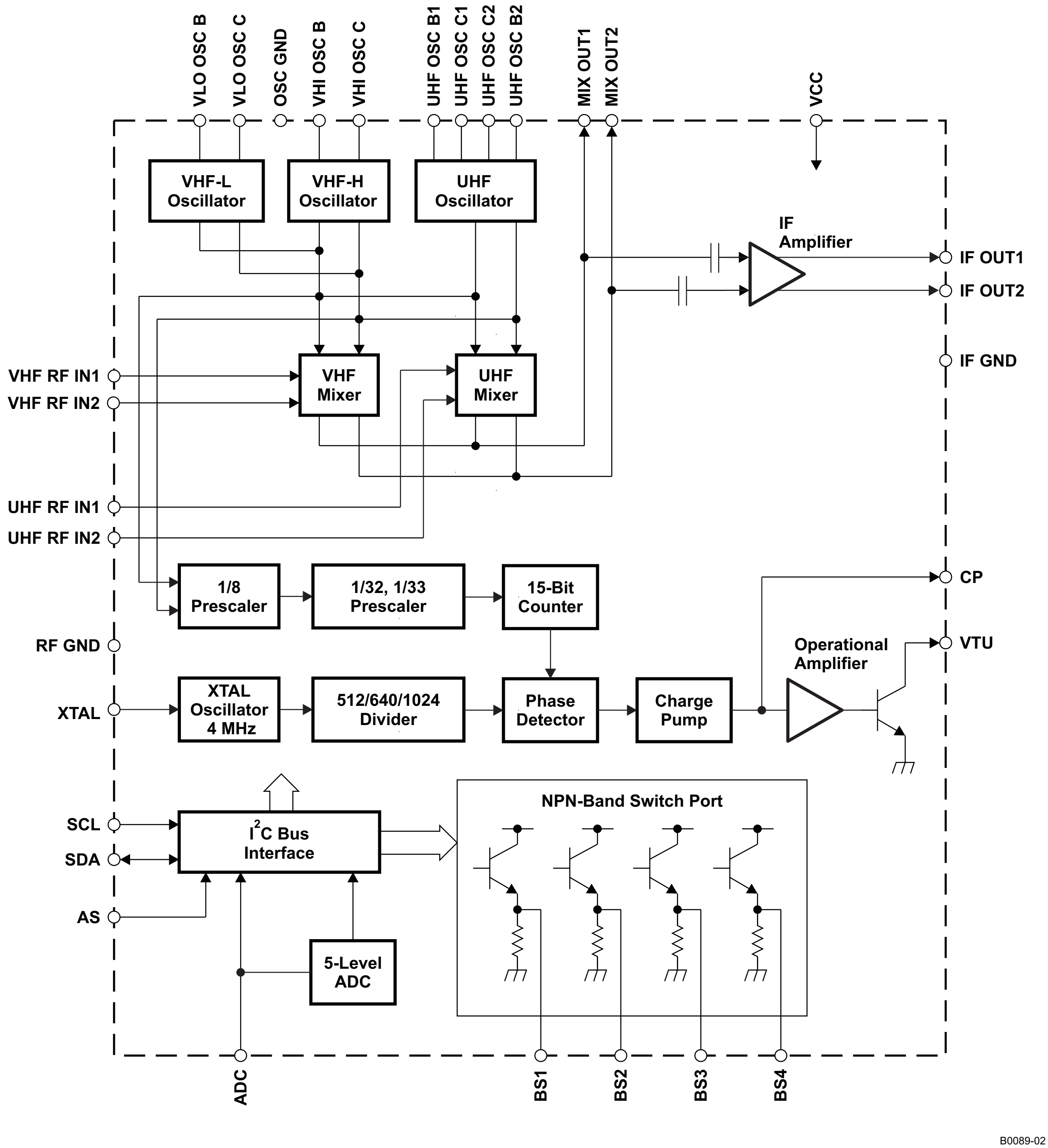
- TVs
- VCR/DVD Recorders
- Set-Top Boxes

DESCRIPTION

The SN761683B is a synthesized tuner IC designed for TV tuning systems. The circuit consists of a phase-locked loop (PLL) synthesizer, three-band local oscillator and mixer, 30-V output tuning amplifier, and four NPN band-switch drivers, and is available in a small-outline package. A 15-bit programmable counter and reference divider are controlled by inter-integrated circuit (I^2C) bus protocol.

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the bipolar device.

FUNCTIONAL BLOCK DIAGRAM



TERMINAL FUNCTIONS

TERMINAL		DESCRIPTION	SCHEMATIC
NAME	NO.		
ADC	20	ADC input	Figure 1
AS	19	Address selection input	Figure 2
BS1	22	Band-switch 1 output (NPN emitter follower)	Figure 3
BS2	23	Band-switch 2 output (NPN emitter follower)	Figure 3
BS3	24	Band-switch 3 output (NPN emitter follower)	Figure 3
BS4	25	Band-switch 4 output (NPN emitter follower)	Figure 3
CP	14	Charge-pump output	Figure 4
IF GND	10	IF ground	
IF OUT1	11	IF output 1	Figure 5
IF OUT2	12	IF output 2	Figure 5
MIX OUT1	26	Mixer output 1	Figure 6
MIX OUT2	27	Mixer output 2	Figure 6
NC	21	No connection	
OSC GND	3	Oscillator ground	
RF GND	28	RF ground	
SCL	17	Serial clock input	Figure 7
SDA	18	Serial data input/output	Figure 8
UHF OSC B1	6	UHF oscillator base 1	Figure 9
UHF OSC B2	9	UHF oscillator base 2	Figure 9
UHF OSC C1	7	UHF oscillator collector 1	Figure 9
UHF OSC C2	8	UHF oscillator collector 2	Figure 9
UHF RF IN1	31	UHF RF input 1	Figure 10
UHF RF IN2	32	UHF RF input 2	Figure 10
VCC	13	Supply voltage for mixer/oscillator/PLL: 5 V	
VHF RF IN1	29	VHF RF input 1	Figure 11
VHF RF IN2	30	VHF RF input 2	Figure 11
VHI OSC B	4	VHF HIGH oscillator base	Figure 12
VHI OSC C	5	VHF HIGH oscillator collector	Figure 12
VLO OSC B	1	VHF LOW oscillator base	Figure 13
VLO OSC C	2	VHF LOW oscillator collector	Figure 13
VTU	15	Tuning voltage amplifier output	Figure 14
XTAL	16	4-MHz crystal oscillator input	Figure 15

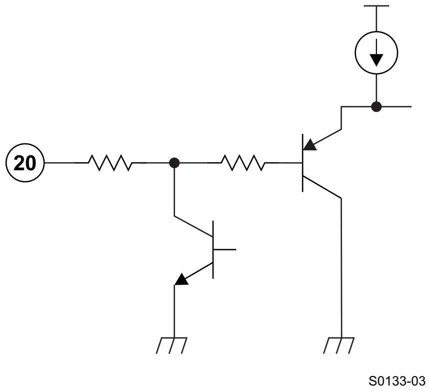


Figure 1.

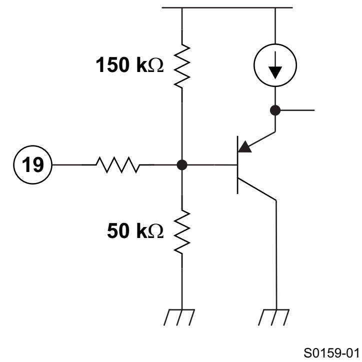


Figure 2.

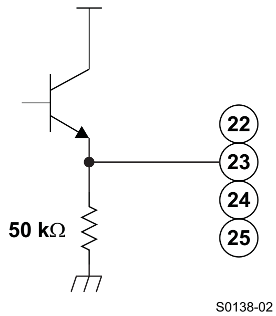


Figure 3.

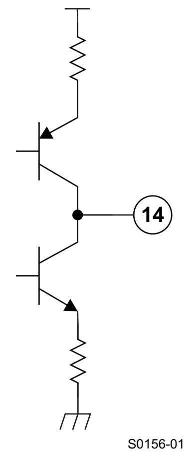


Figure 4.

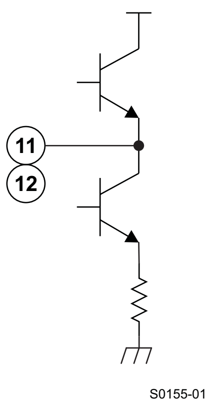


Figure 5.

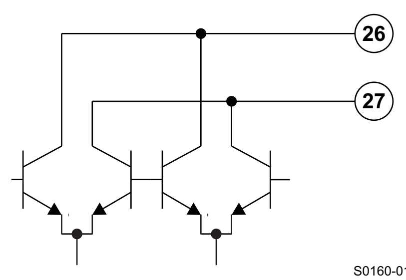


Figure 6.

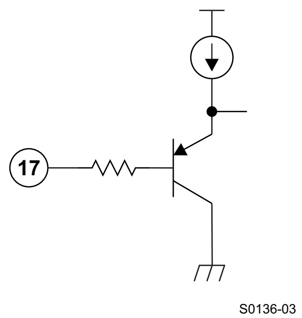


Figure 7.

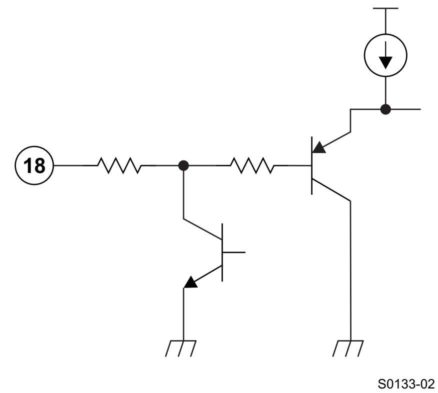


Figure 8.

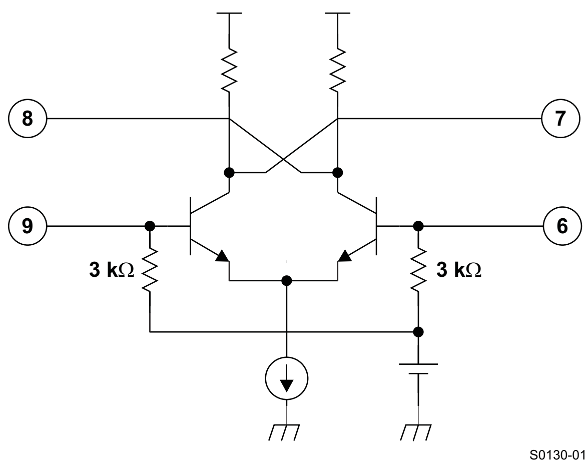


Figure 9.

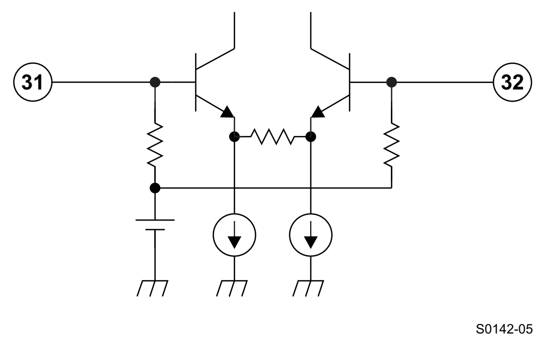


Figure 10.

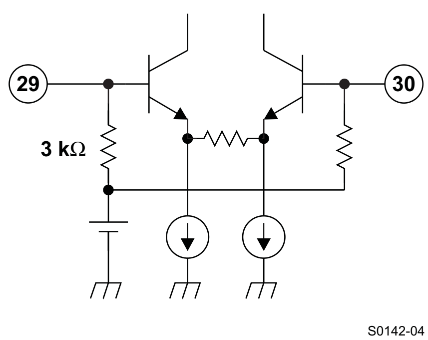


Figure 11.

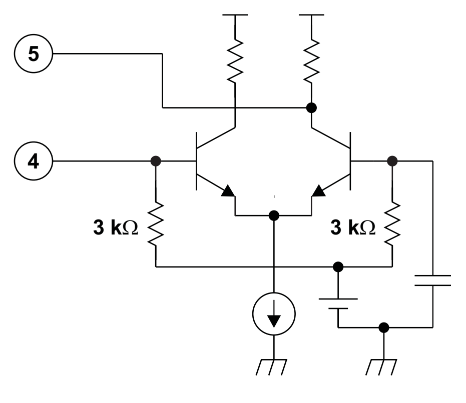


Figure 12.

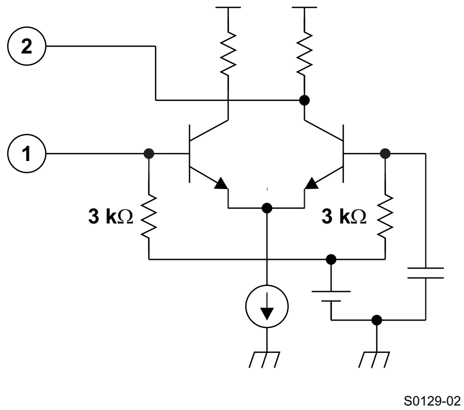


Figure 13.

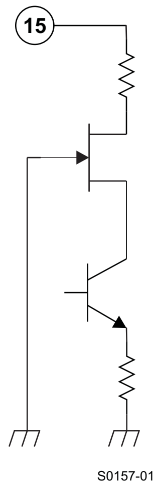


Figure 14.

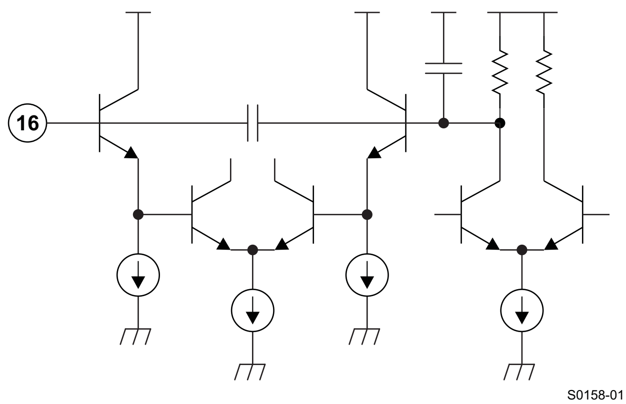


Figure 15.

Absolute Maximum Ratings(1)

over operating free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V_{CC}	Supply voltage range(2)	VCC	–0.4	6.5	V
V_{GND}	Input voltage range 1(2)	RF GND, OSC GND	–0.4	0.4	V
V_{VTU}	Input voltage range 2(2)	VTU	–0.4	35	V
V_{IN}	Input voltage range 3(2)	All other pins	–0.4	6.5	V
P_D	Continuous total dissipation(3)	$T_A \leq 25°C$		1040	mW
T_A	Operating free-air temperature range		–20	85	°C
T_{stg}	Storage temperature range		–65	150	°C
T_{JC}	Maximum junction temperature			150	°C
$t_{SC(max)}$	Maximum short-circuit time	All pins to VCC, All pins to IFGND, OSCGND, RFGND		10	s

(1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) Voltage values are with respect to IF GND.
(3) Derating factor is 8.33 mW/°C for $T_A \geq 25°C$.

Recommended Operating Conditions

			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		4.5	5	5.5	V
V_{TU}	Tuning supply voltage			30	33	V
I_{BS}	Output current of band switch	One port on			10	mA
T_A	Operating free-air temperature		–20		85	°C

Total Device and Serial Interface Electrical Characteristics

V_{CC} = 4.5 V to 5.5 V, T_A = –20°C to 85°C (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
$I_{CC}1$	Supply current 1				60		mA
$I_{CC}2$	Supply current 2		One band switch on (I_{BS} = 10 mA)		70		mA
V_{IH}	High-level input voltage	SCL, SDA		2.8		V_{CC}	V
V_{IL}	Low-level input voltage	SCL, SDA				1.4	V
I_{IH}	High-level input current	SCL, SDA				10	µA
I_{IL}	Low-level input current	SCL, SDA		–10			µA
V_{POR}	Power-on-reset supply voltage (threshold of supply voltage between reset and operation mode)			2.1	2.8	3.6	V
I²C Interface							
V_{ASH}	Address-select high-input voltage	AS	V_{CC} = 5 V	4.5		5	V
V_{ASM1}	Address-select mid1-input voltage	AS	V_{CC} = 5 V	2		3	V
V_{ASM2}	Address-select mid2-input voltage	AS	V_{CC} = 5 V	1		1.5	V
V_{ASL}	Address-select low-input voltage	AS	V_{CC} = 5 V			0.5	V
I_{ASH}	Address-select high-input current	AS				140	µA
I_{ASL}	Address-select low-input current	AS		–50			µA
V_{ADC}	ADC input voltage		See Table 8	0		V_{CC}	V
I_{ADH}	ADC high-level input current		V_{ADC} = V_{CC}			10	µA
I_{ADL}	ADC low-level input current		V_{ADC} = 0 V	–50			µA
V_{OL}	Low-level output voltage	SDA	V_{CC} = 5 V, I_{OL} = 3 mA			0.4	V
I_{SDAH}	High-level output leakage current	SDA	V_{SDA} = 5.5 V			10	µA
f_{SCL}	Clock frequency	SCL			100	400	kHz
$t_{hd(DAT)}$	Data hold time		See Figure 16	0			µs
$t_{(BUF)}$	Bus free time		See Figure 16	1.3			µs
$t_{hd(STA)}$	Start hold time		See Figure 16	0.6			µs
$t_{(LOW)}$	SCL-low hold time		See Figure 16	1.3			µs
$t_{(HIGH)}$	SCL-high hold time		See Figure 16	0.6			µs
$t_{su(STA)}$	Start setup time		See Figure 16	0.6			µs
$t_{su(DAT)}$	Data setup time		See Figure 16	0.1			µs
t_r	SCL, SDA rise time		See Figure 16			0.3	µs
t_f	SCL, SDA fall time		See Figure 16			0.3	µs
$t_{su(STO)}$	Stop setup time		See Figure 16	0.6			µs

TEXAS INSTRUMENTS
www.ti.com

PLL and Band-Switch Electrical Characteristics

V_{CC} = 4.5 V to 5.5 V, T_A = –20°C to 85°C (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
N	Divider ratio		15-bit frequency word	256		32767	
f_{XTAL}	Crystal oscillator frequency		R_{XTAL} = 25 Ω to 300 Ω	3.2	4	4.48	MHz
Z_{XTAL}	Crystal oscillator input impedance				1.6		kΩ
V_{IXTAL2}	Minimum reference input sensitivity	XTAL	4 MHz, AC coupling with 0.1-µF capacitor			100	mVp-p
V_{VTUL}	Tuning amplifier low-level output voltage		R_L = 27 kΩ, V_{TU} = 33 V		0.4	0.5	V
I_{VTUOFF}	Tuning amplifier leakage current (OFF)		OS = 1, V_{TU} = 33 V			10	µA
I_{CPH}	Charge-pump high-level input current		CP = 1		280		µA
I_{CPL}	Charge-pump low-level input current		CP = 0		60		µA
V_{CP}	Charge-pump output voltage		PLL locked		1.95		V
I_{CPOFF}	Charge-pump leakage current		T2 = 0, T1 = 1, V_{CP} = 2 V, T_A = 25°C	–15		15	nA
I_{BS}	Band-switch driver output current					10	mA
V_{BS1}	Band-switch driver output voltage		I_{BS} = 10 mA	3			V
V_{BS2}			I_{BS} = 10 mA, V_{CC} = 5 V, T_A = 25°C	3.5	3.9		
I_{BSOFF}	Band-switch driver leakage current		V_{BS} = 0 V			3	µA

Mixer, Oscillator, IF Amplifier Electrical Characteristics

V_{CC} = 5 V, T_A = 25°C, measured in Figure 17 reference measurement circuit at 50-Ω system,
IF filter characteristics: f_{peak} = 43 MHz (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
G_{c1}	Conversion gain (mixer-IF amplifier), VHF-LOW(1)	f_{in} = 58 MHz	22	25	28	dB
G_{c3}		f_{in} = 130 MHz	22	25	28	
G_{c4}	Conversion gain (mixer-IF amplifier), VHF-HIGH(1)	f_{in} = 136 MHz	22	25	28	dB
G_{c6}		f_{in} = 364 MHz	22	25	28	
G_{c7}	Conversion gain (mixer-IF amplifier), UHF(1)	f_{in} = 370 MHz	26	29	32	dB
G_{c9}		f_{in} = 804 MHz	25	28	31	
NF_1	Noise figure, VHF-LOW	f_{in} = 55.25 MHz		9.5		dB
NF_3		f_{in} = 127.25 MHz		9.5		
NF_4	Noise figure, VHF-HIGH	f_{in} = 133.25 MHz		10		dB
NF_6		f_{in} = 361.25 MHz		10		
NF_7	Noise figure, UHF	f_{in} = 367.25 MHz		11		dB
NF_9		f_{in} = 801.25 MHz		11		
CM_1	1% cross-modulation distortion, VHF-LOW(2)	f_{in} = 55.25 MHz		89		dBµV
CM_3		f_{in} = 127.25 MHz		89		
CM_4	1% cross-modulation distortion, VHF-HIGH(2)	f_{in} = 133.25 MHz		86		dBµV
CM_6		f_{in} = 361.25 MHz		86		
CM_7	1% cross-modulation distortion, UHF(2)	f_{in} = 367.25MHz		87		dBµV
CM_9		f_{in} = 801.25 MHz		87		
V_{IFO1}	IF output voltage, VHF-LOW(3)	f_{in} = 55.25 MHz		117		dBµV
V_{IFO3}		f_{in} = 127.25 MHz		117		
V_{IFO4}	IF output voltage, VHF-HIGH(3)	f_{in} = 133.25 MHz		117		dBµV
V_{IFO6}		f_{in} = 361.25 MHz		117		
V_{IFO7}	IF output voltage, UHF(3)	f_{in} = 367.25MHz		117		dBµV
V_{IFO9}		f_{in} = 801.25 MHz		117		
Φ_{OSC1}	Phase noise, VHF-LOW(4)	f_{in} = 55.25 MHz		88		dBc/Hz
Φ_{OSC3}		f_{in} = 127.25 MHz		88		
Φ_{OSC4}	Phase noise, VHF-HIGH(4)	f_{in} = 133.25 MHz		86		dBc/Hz
Φ_{OSC6}		f_{in} = 361.25 MHz		86		
Φ_{OSC7}	Phase noise, UHF(4)	f_{in} = 367.25MHz		84		dBc/Hz
Φ_{OSC9}		f_{in} = 801.25 MHz		84		
	Prescaler beat(5)				25	dBµV

(1) IF = 43 MHz, RF input level = 80 dBµV
(2) f_{undes} = f_{des} ±6 MHz, Pin = 80 dBµV, AM 1 kHz, 30%, DES/CM = S/I = 46 dB
(3) IF = 45.75 MHz
(4) Offset = 10 kHz, RF input level = 70 dBµV
(5) Design parameter, not tested

FUNCTIONAL DESCRIPTION

I²C Bus Mode

I²C Write Mode (R/W = 0)

Table 1. Write Data Format

	MSB							LSB	
Address byte (ADB)	1	1	0	0	0	MA1	MA0	R/W = 0	A(1)
Divider byte 1 (DB1)	0	N14	N13	N12	N11	N10	N9	N8	A(1)
Divider byte 2 (DB2)	N7	N6	N5	N4	N3	N2	N1	N0	A(1)
Control byte (CB)	1	CP	T2	T1	T0	RSA	RSB	OS	A(1)
Band-switch byte (BB)	X	X	X	X	BS4	BS3	BS2	BS1	A(1)

(1) Acknowledge

Table 2. I²C Write-Mode Data-Symbol Description

SYMBOL	DESCRIPTION	DEFAULT
MA1, MA0	Address set bits (see Table 3)	
N14–N0	Programmable counter set bits $N = N14 \times 2^{14} + N13 \times 2^{13} + ... + N1 \times 2 + N0$ Oscillation frequency = $f_r \times 8 \times N$ f_r = Reference frequency = 4 MHz/Reference divider	Nn = 0
CP	Charge-pump current set bit 60 µA (CP = 0), 280 µA (CP = 1)	CP = 1
T2–T0	Test bits (see Table 4) Normal mode: T2 = 0, T1 = 0, T0 = 1/0	T2 = 0, T1 = 0, T0 = 1
RSA, RSB	Reference divider ratio selection bits (see Table 6)	RSA = 0, RSB = 1
OS	Tuning amplifier control bit Tuning voltage on (OS = 0) Tuning voltage off, high impedance (OS = 1)	OS = 0
BS4–BS1	Band-switch ports control bits BS3 = 1: BS3 port ON BS3 = 0: BS3 port OFF Band selection by BS1, BS2, and BS4 bits: **BS1 / BS2 / BS4 / SELECTED BAND / "ON" PORT** 0 / 0 / 0 / UHF / BS4 1 / 0 / 0 / VHF-LOW / BS1 0 / 1 / 0 / VHF-HIGH / BS2 1 / 1 / 0(1) / VHF-HIGH / (BS1, BS2) 0 / 0 / 1 / UHF / BS4 1 / 0 / 1(1) / UHF / (BS1, BS4) 0 / 1 / 1(1) / UHF / (BS2, BS4) 1 / 1 / 1(1) / UHF / (BS1, BS2, BS4) (1) These bit patterns are forbidden, due to limitation of band-switch output current.	BSn = 0 (UHF)
X	Don't care	

Table 3. Address Selection

MA1	MA0	VOLTAGE APPLIED ON AS INPUT
0	0	LOW: 0 V to 0.1 V_{CC}
0	1	MID2: open, or 0.2 V_{CC} to 0.3 V_{CC}
1	0	MID1: 0.4 V_{CC} to 0.6 V_{CC}
1	1	HIGH: 0.9 V_{CC} to V_{CC}

Table 4. Test Bits (1)

T2	T1	T0	DEVICE OPERATION	NOTE
0	0	0	Normal operation	
0	0	1	Normal operation	Default
0	1	X	Charge pump is off.	
1	1	0	Charge pump is sink.	
1	1	1	Charge pump is source.	
1	0	X	Test mode	ADC not available

(1) Not used for other bit patterns

Table 5. Reference Divider Ratio

RSA	RSB	REFERENCE DIVIDER RATIO
X	0	640
0	1	1024
1	1	512

Example of I^2C Data-Write Sequences

Telegram Examples

Start – ADB – DB1 – DB2 – CB – BB – Stop
Start – ADB – DB1 – DB2 – Stop
Start – ADB – CB – BB – Stop

Abbreviations

ADB: Address byte
DB1: Divider byte 1
DB2: Divider byte 2
CB: Control byte
BB: Band-switch byte
Start: Start condition
Stop: Stop condition

Note: Following bytes after band-switch byte (BB) are ignored.

Start – ADB – DB1 – DB2 – CB – BB – (ignored) – (ignored) – Stop
Start – ADB – CB – BB – (ignored) – (ignored) – Stop

I²C Read Mode (R/W = 1)

Table 6. Read Data Format

	MSB							LSB	
Address byte (ADB)	1	1	0	0	0	MA1	MA0	R/W = 1	A(1)
Status byte (SB)	POR	FL	1	1	1	A2	A1	A0	–

(1) Acknowledge

Table 7. I²C Read-Mode Data-Symbol Description

SYMBOL	DESCRIPTION	DEFAULT
MA1, MA0	Address set bits (see Table 3)	
POR	Power-on reset flag bit POR set: Power on POR reset: End-of-data transmission procedure	POR = 1
FL	In-lock flag bit PLL locked (FL = 1) PLL unlocked (FL = 0)	
A2–A0	Digital data bits of ADC (see Table 8)	

Table 8. ADC Level

A2	A1	A0	VOLTAGE APPLIED ON ADC INPUT(1)
1	0	0	0.6 V_{CC} to V_{CC}
0	1	1	0.45 V_{CC} to 0.6 V_{CC}
0	1	0	0.3 V_{CC} to 0.45 V_{CC}
0	0	1	0.15 V_{CC} to 0.3 V_{CC}
0	0	0	0 to 0.15 V_{CC}

(1) Accuracy is $0.03 \times V_{CC}$.

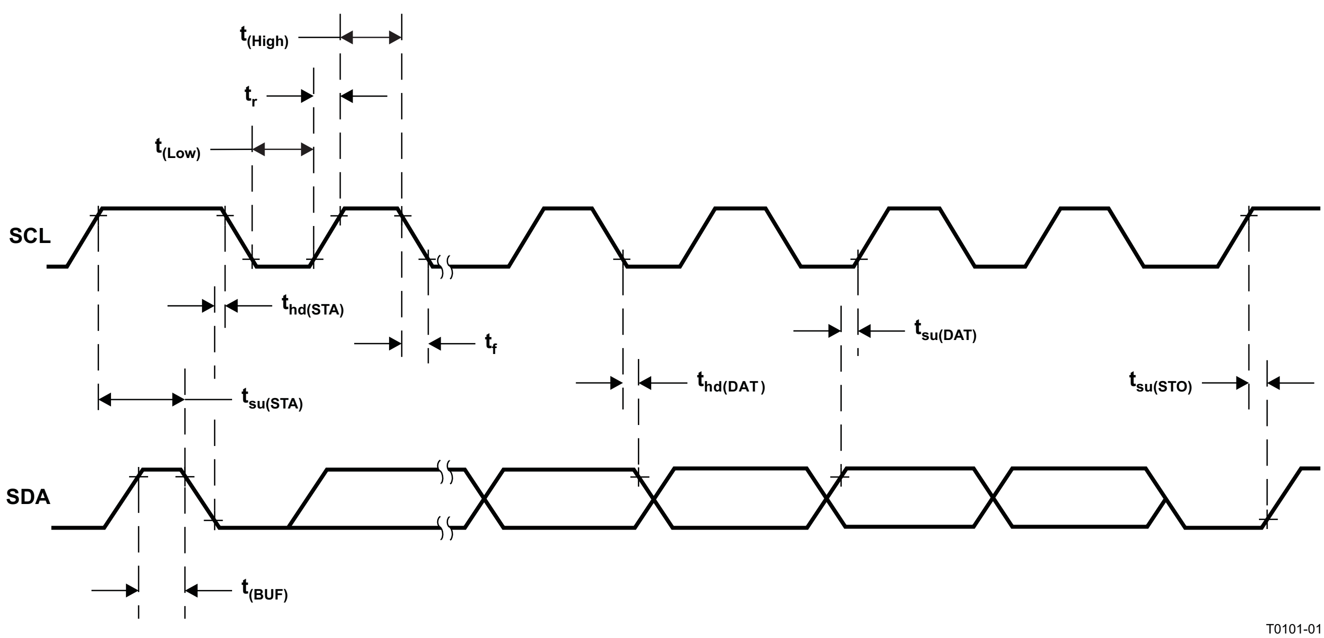
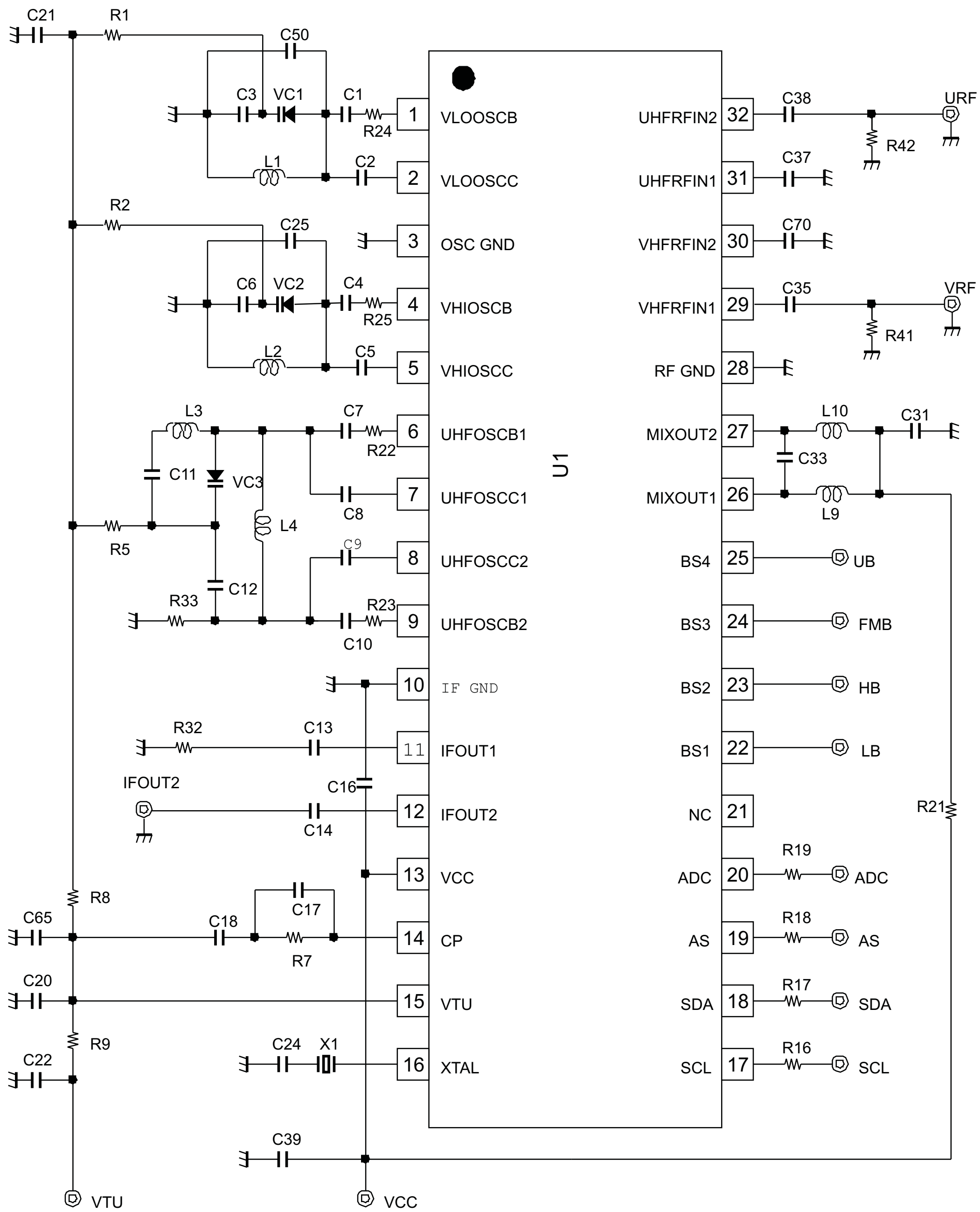


Figure 16. I²C Timing Chart

APPLICATION INFORMATION



NOTE: This application information is advisory, and a performance check is required for actual application circuits. TI assumes no responsibility for the consequences of use of this circuit, such as an infringement of intellectual property rights or other rights, including patents, of third parties.

Figure 17. Reference Measurement Circuit

Texas Instruments
www.ti.com

Table 9. Component Values for Measurement Circuit

PART NAME	VALUE	PART NAME	VALUE
C1	1p	L1	ϕ3mm, 8T, wire 0.32mm
C2	1p	L2	ϕ2.4mm, 4T, wire 0.4mm
C3	47p	L3	ϕ3mm, 2T, wire 0.4mm
C4	2p	L4	ϕ2mm, 3T, wire 0.4mm
C5	3p	L9	ϕ3mm, 15T, wire 0.25mm
C6	68p	L10	ϕ3mm, 15T, wire 0.25mm
C7	1.5p	R1	33k
C8	1p	R2	33k
C9	1p	R5	22k
C10	1.5p	R7	22k
C11	100p	R8	33k
C12	12p	R9	22k
C13	2.2n	R16	330
C14	2.2n	R17	330
C16	4.7n	R18	330
C17	2.2n	R19	330
C18	0.1u	R21	0
C20	2.2n	R22	20
C21	2.2n	R23	20
C22	2.2n	R24	20
C24	68p	R25	20
C25	open	R32	51
C31	4.7n	R33	22k
C33	22p	R41	51
C35	2.2n	R42	51
C37	2.2n	U1	SN761683B
C38	2.2n	VC1	1T363A
C39	4.7n	VC2	1T363A
C50	3p	VC3	1T363A
C65	2.2n	X1	Crystal 4 MHz
C70	2.2n		

TEST CIRCUITS

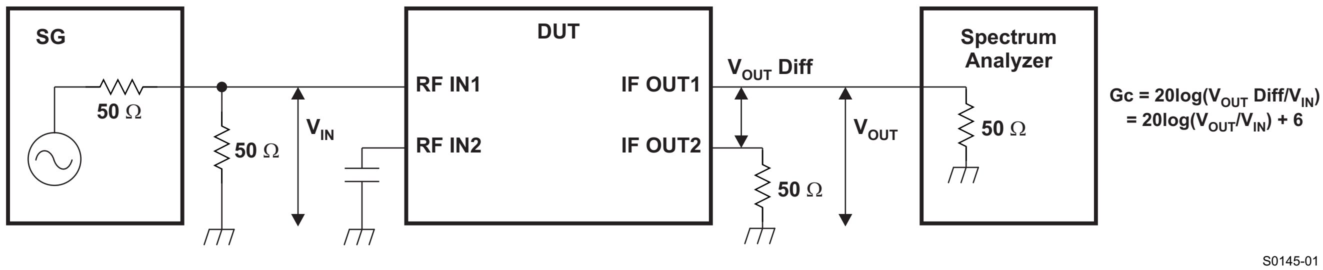


Figure 18. Conversion Gain-Measurement Circuit

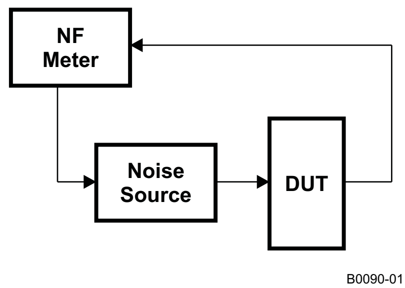


Figure 19. Noise-Figure Measurement Circuit

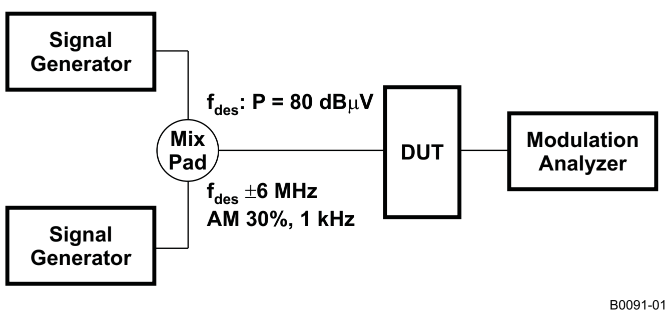


Figure 20. 1% Cross-Modulation Distortion Measurement Circuit

TYPICAL CHARACTERISTICS

Band-Switch Driver Output Voltage (BS1–BS4)

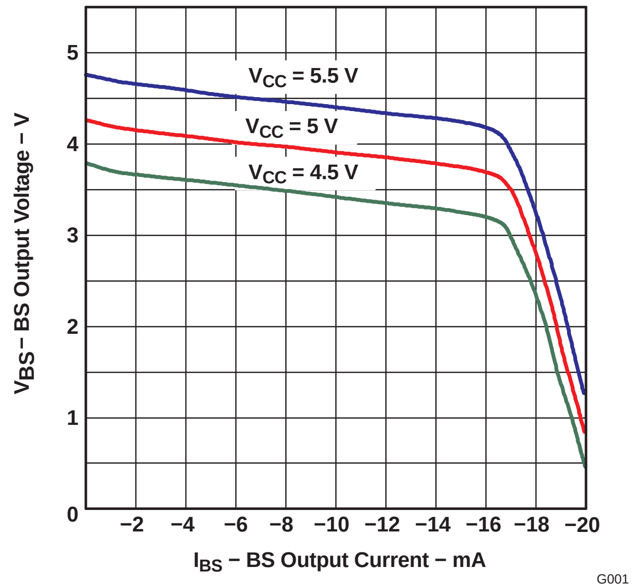


Figure 21. BS Output Current vs Output Voltage

S-Parameter

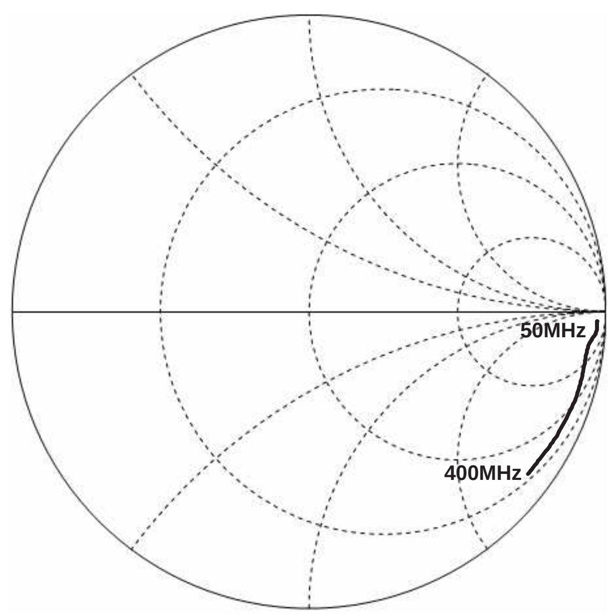


Figure 22. VHF Input

TYPICAL CHARACTERISTICS (continued)

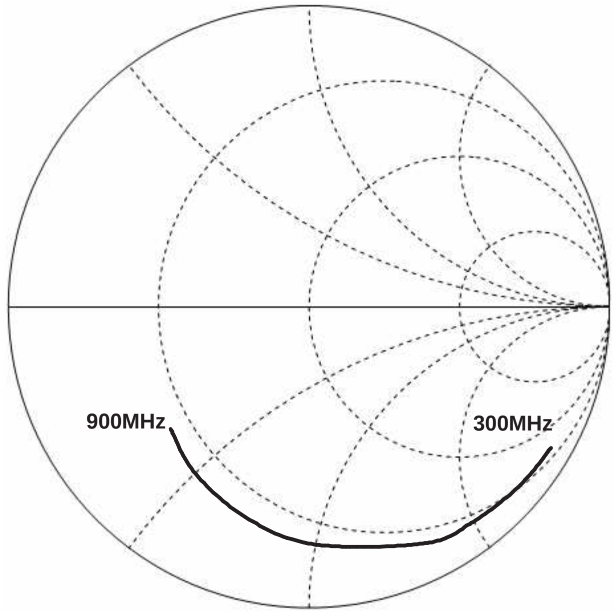


Figure 23. UHF Input

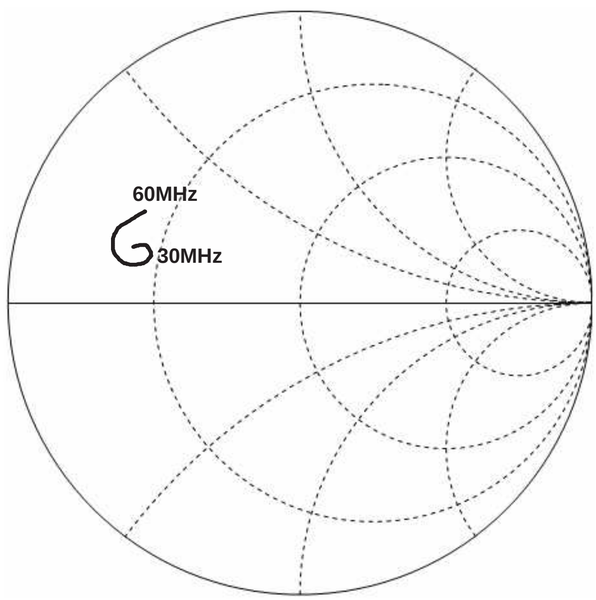


Figure 24. IF Output

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
SN761683BDA	ACTIVE	TSSOP	DA	32	46	TBD	Call TI	Call TI
SN761683BDAG4	ACTIVE	TSSOP	DA	32	46	TBD	Call TI	Call TI
SN761683BDAR	ACTIVE	TSSOP	DA	32	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
SN761683BDARG4	ACTIVE	TSSOP	DA	32	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

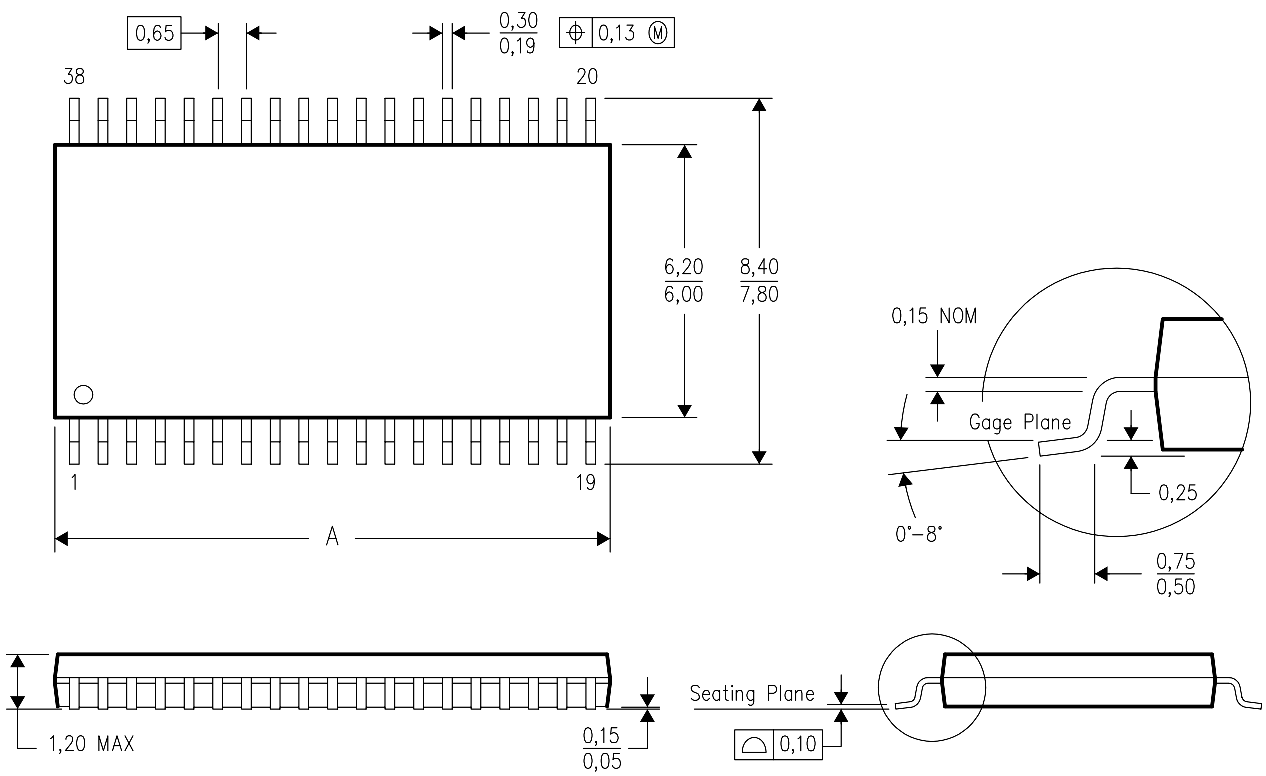
[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

DA (R-PDSO-G**) PLASTIC SMALL-OUTLINE PACKAGE

38 PIN SHOWN



PINS ** / DIM	30	32	38
A MAX	11,10	11,10	12,60
A MIN	10,90	10,90	12,40

4040066/E 11/05

NOTES:
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-153

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Interface	interface.ti.com	Digital Control	www.ti.com/digitalcontrol
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
Low Power Wireless	www.ti.com/lpw	Telephony	www.ti.com/telephony
		Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments
Post Office Box 655303 Dallas, Texas 75265