FEATURES

- **Typical Carrier Suppression > 35 dBc**
- **Large Signal Output**
- **Differential or Single-Ended Signal Output**
- **Silicon Germanium Technology**

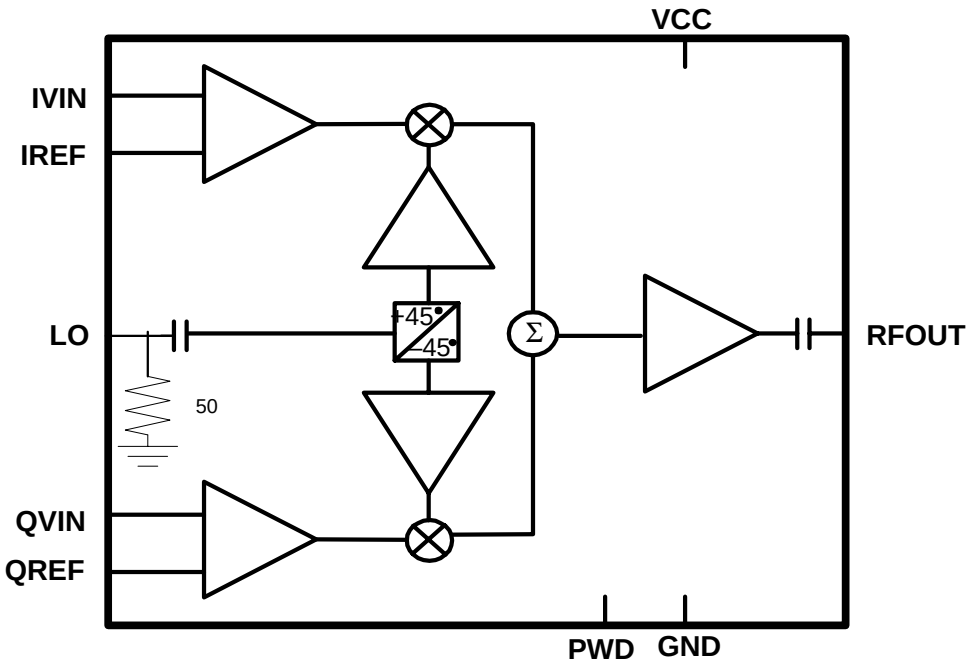
APPLICATIONS

- **Transmit Channel TDMA: GSM, IS-136, Edge/UMC-136**
- **CDMA: IS-95, UMTS, CDMA2000**
- **Wireless Local Loop**
- **Wireless LAN IEEE 802.11**
- **LMDS, MMDS**

description

The TRF3701 is a low noise quadrature direct modulator that is capable of converting complex input signals from 0 – 300 MHz up to RF. An internal analog combiner sums the real and imaginary components of the RF outputs. This combined output can directly feed the RF pre-amp at frequencies of up to 1.0 GHz. The modulator is implemented as a double balanced mixer. An internal LO phase splitter accommodates a single LO input.

functional block diagram



PRODUCT PREVIEW

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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absolute maximum ratings over operating free-air temperature (unless otherwise noted)†

Supply voltage range, V_{CC} . . . . . –0.5 V to 5.5 V
Input current range, I_I: IVIN . . . . . TBD
QVIN . . . . . TBD
IREF . . . . . TBD
QREF . . . . . TBD
V_{CC} . . . . . TBD
Total current, peak (all inputs) . . . . . TBD
Operating free-air temperature range, T_A: TRF3701C . . . . . 0°C to 70°C
TRF3701I . . . . . –40°C to 85°C
Lead temperature 1, 6 mm (1/16 inch) from the case for 10 seconds . . . . . 260°C

† 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.

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supplies and References				
Analog DC supply voltage, V_{CC}	4.75	5	5.5	V
Reference voltage, IREF, QREF	3.9	4.1	V_{CC}–0.5	V
Local Oscillator Input (LO)				
Input Frequency, f	TBD		1000	MHz
Power level (refer to specified input impedance)	–6		6	dBm
Signal Inputs (IVIN, QVIN)				
Input frequency range (1dB)	0		300	MHz

PRODUCT PREVIEW

electrical characteristics, GSM 900 (925 MHz) signal performance over recommended operating conditions, V_{CC} = 5 V, $V_{I(IREF)}$=$V_{I(QREF)}$ = 4.1 V, Z_L = 50 Ω, $P_{(LO)}$ = –5 dBm, single-ended input

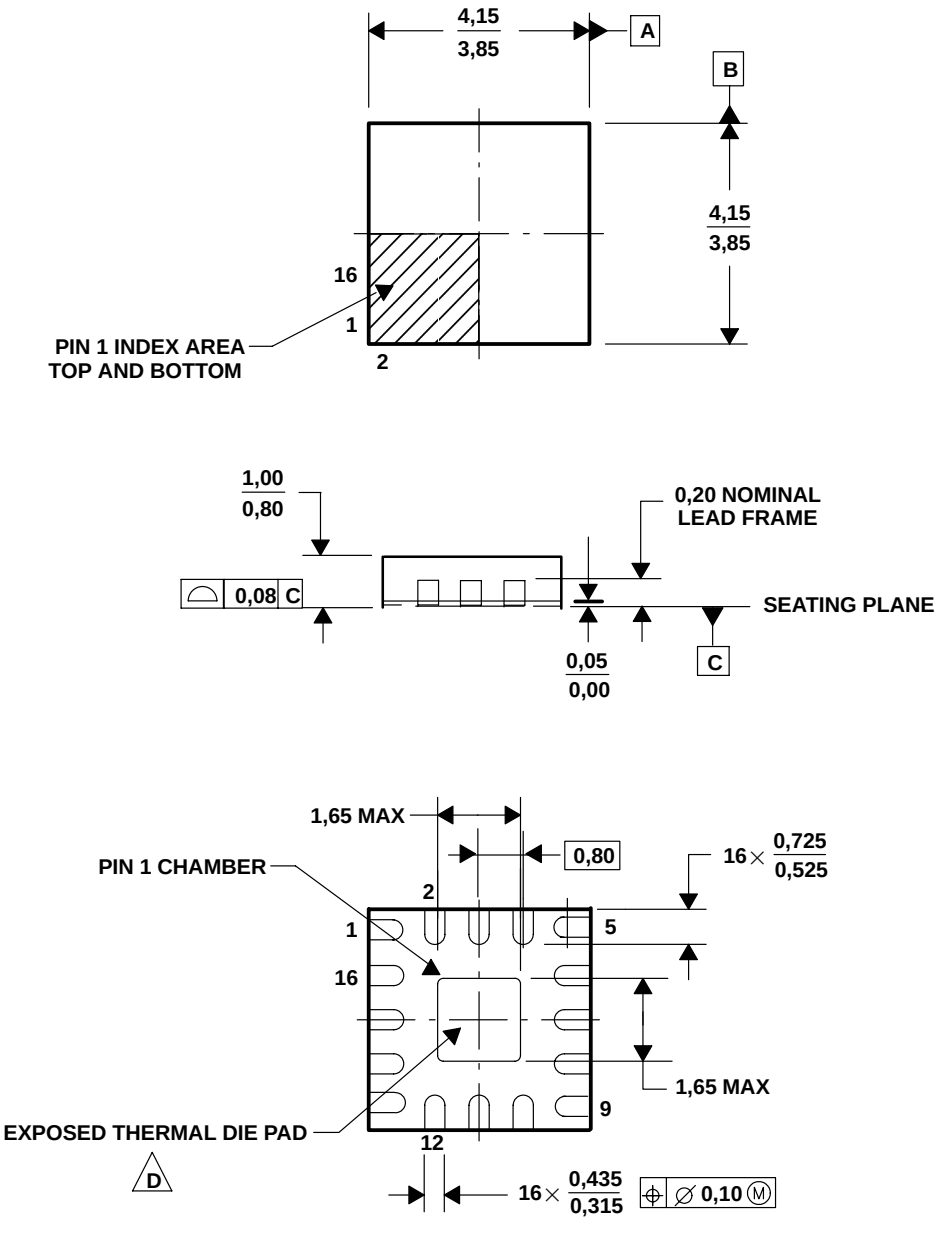
PARAMETER	CONDITIONS		MIN	TYP	MAX	UNIT
IMD	I Signal: $f_{(1)}$ = 100 kHz, $f_{(2)}$ = 300 kHz, Q Signal: $f_{(1)}$ = 100 kHz, $f_{(2)}$ = 300 kHz, $f_{(LO)}$ = 925 MHz, $V_{I(IVIN)}$=$V_{I(QVIN)}$ = 0.6 V, $P_{(LO)}$ = –5 dBm			65		dBc
IP3 (Output referred)	$f_{(LO)}$ = 925 MHz, $f_{(1)}$= 100 kHz, $f_{(2)}$ = 300 kHz, $V_{I(IVIN)}$=$V_{I(QVIN)}$ = 0 – 1.5 V			18		dBm
1–dB Intercept point (Output referred)	$f_{(LO)}$ = 925 MHz, $f_{(1)}$=100 kHz, $V_{I(IVIN)}$=$V_{I(QVIN)}$ = 0 – 1.5 V			5		dBm
Noise spectral density (NSD)	$f_{(LO)}$ = 925 MHz, offset –20 Mhz, 30 kHz Resolution = .B/W, $V_{I(IVIN)}$=$V_{I(QVIN)}$=$V_{I(IREF)}$ =$V_{I(QREF)}$ = 4.1 V			–157		dBm/Hz
Output Power	Single tone 100 kHz, IVIN =QVIN= 1.0V, I and Q signals driven in quadrature.		–5	–4		dBm
Output Impedance	$P_{(LO)}$ = 0, IVIN =QVIN= O/C			30 – j1		Ω
Carrier suppression (unadjusted)	Single tone 100 kHz, IVIN =QVIN= 1.0, I and Q signals driven in quadrature. $P_{(RFOUT)}$ = –4 dBm.		35			dBc
Sideband suppression (unadjusted)	Single tone 100 kHz, IVIN =QVIN= 1.0V, I and Q signals driven in quadrature. $P_{(RFOUT)}$ = –4 dBm.		30	35		dB
Phase error	Single tone 100 kHz, IVIN =QVIN= 1.0 V, I and Q signals driven in quadrature. $P_{(RFOUT)}$ = –4 dBm.			1°		
Noise figure	Single tone 100 kHz, IVIN =QVIN= 1.0 V, I and Q signals driven in quadrature			24	27	dB
Conversion loss	Single tone 100 kHz, IVIN =QVIN= 1.0 V, I and Q signals driven in quadrature. $P_{(RFOUT)}$ = –5 dBm			8		dB
EVM	Integrated across GSM 28 symbol midamble, GSM DC – 100 kHz, $P_{(RFOUT)}$ = –5 dBm, IVIN = QVIN = 1.0 V			2		%
Modulation mask	Single GSM 200 kHz carrier, 20 MHz Offset $P_{(RFOUT)}$ = –5 dBm	100 kHz offset, 30 kHz bandwidth	–3.5			dBc
		200 kHz offset, 30 kHz bandwidth	–35			
		250 kHz offset, 30 kHz bandwidth	–38			
		400 kHz offset, 30 kHz bandwidth	–72			
		≥ 600 kHz < 1200 kHz, 30 kHz BW	–82			
		≥ 1200 kHz < 1800 kHz, 30 kHz BW	–85			
		≥ 1800 kHz < 6000 kHz, 30 kHz BW	–87			
		≥ 6000 kHz, 100 kHz BW	–92			

PRODUCT PREVIEW

PRODUCT PREVIEW

MECHANICAL DATA

RHC (S–PQFP–N16) **(CUSTOM PACKAGE)** **PLASTIC QUAD FLATPACK**



NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. QFN (Quad Flatpack No–Lead) Package configuration.
D. The Package thermal performance may be enhanced by bonding the thermal die pad to an external thermal plane. This pad is electrically and thermally connected to the backside of the die and possibly selected ground leads.

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