



QPC7339

5MHz to 396MHz Variable Cable Slope Equalizer

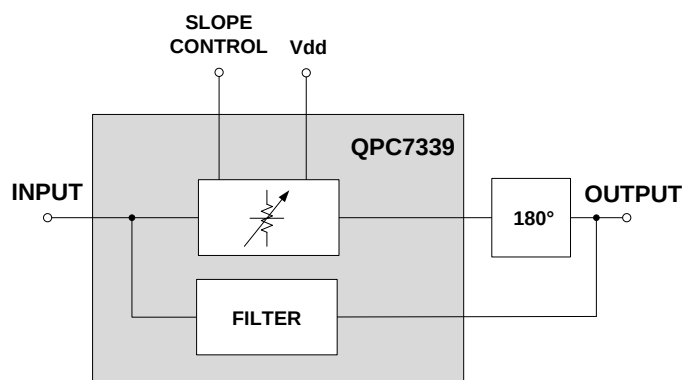
Product Overview

The QPC7339 is a cable compensated voltage controlled variable equalizer employing SOI attenuator with operation bandwidth from 5MHz to 396MHz, optimized for operation between 15MHz and 396MHz.



14 pin, 6.0 mm x 6.0 mm x 1.375 mm package

Functional Block Diagram



Key Features

- 5 – 396 MHz Operational Bandwidth
- Inverse cable loss frequency response
- 19dB slope range
- Low insertion loss
- High linearity
- 75Ohm impedance for CATV applications
- 5V single supply voltage
- Low power consumption

Applications

- CATV amplifier and transmission systems

Ordering Information

Part No.	Description
QPC7339SB	Sample bag 5 pcs
QPC7339SR	7" Reel with 100 pcs
QPC7339TR7	7" Reel with 500 pcs
QPC7339PCBA-410	Fully assembled Evaluation Board



QPC7339

5MHz to 396MHz Variable Cable Slope Equalizer

Absolute Maximum Ratings

Parameter	Value / Range
Supply Voltage (Vdd)	-0.5 to +6V
Control Voltage (Vc)	-0.5 to +6V
Control Voltage 2 (Vc2)	-2 to +24V
MODE	-0.5 to +6V
Storage Temperature	-40 to 100 °C
RF Input Power	+30 dBm

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Supply Voltage (Vdd)		+5		V
Junction Temperature			+125	°C
Operating Mounting Base Temperature	-30		+100	°C

Electrical specifications are measured at specified test conditions in the application circuit. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications – Tested in Evaluation Circuit

Parameter	Conditions (Vdd=5V, T _{MB} =25°C, Z _S =Z _L =75Ω)	Min	Typ	Max	Units
General Performance					
Supply Current (I _{dd})			3		mA
Thermal Resistance			70		K/W
RF Input Power	T ≤ +85°C			27	dBm
	+85°C < T ≤ +100°C			24	
Input IP3	P _{IN} + (IM3 _{dBc} /2) 6MHz tone spacing at 15dBm/tone	45	50		dBm
Input IP2	P _{IN} + IM2 _{dBc} , IM2 is F1 + F2 6MHz tone spacing at 15dBm/tone		80		dBm
Frequency Range 5 to 396MHz					
Minimum Slope [1]			0.5		dB
Maximum Slope [1]			20		dB
RF Performance, slope set between 1dB (2.5dB/GHz) and 17dB (43.5dB/GHz)					
Insertion Loss (S21)	f = 396MHz		1.8	2.5	dB
Flatness [2]	f = 15 to 396MHz		0.7	1	dB
Input Return Loss (S11)			-18		dB
Output Return Loss (S22)			-17		dB
RF Performance, slope set between 1dB (2.5dB/GHz) and 20dB (51.2dB/GHz)					
Insertion Loss (S21)	f = 396MHz		1.8		dB
Flatness [2]	f = 15 to 396MHz		2		dB
Input Return Loss (S11)			-18		dB
Output Return Loss (S22)			-17		dB



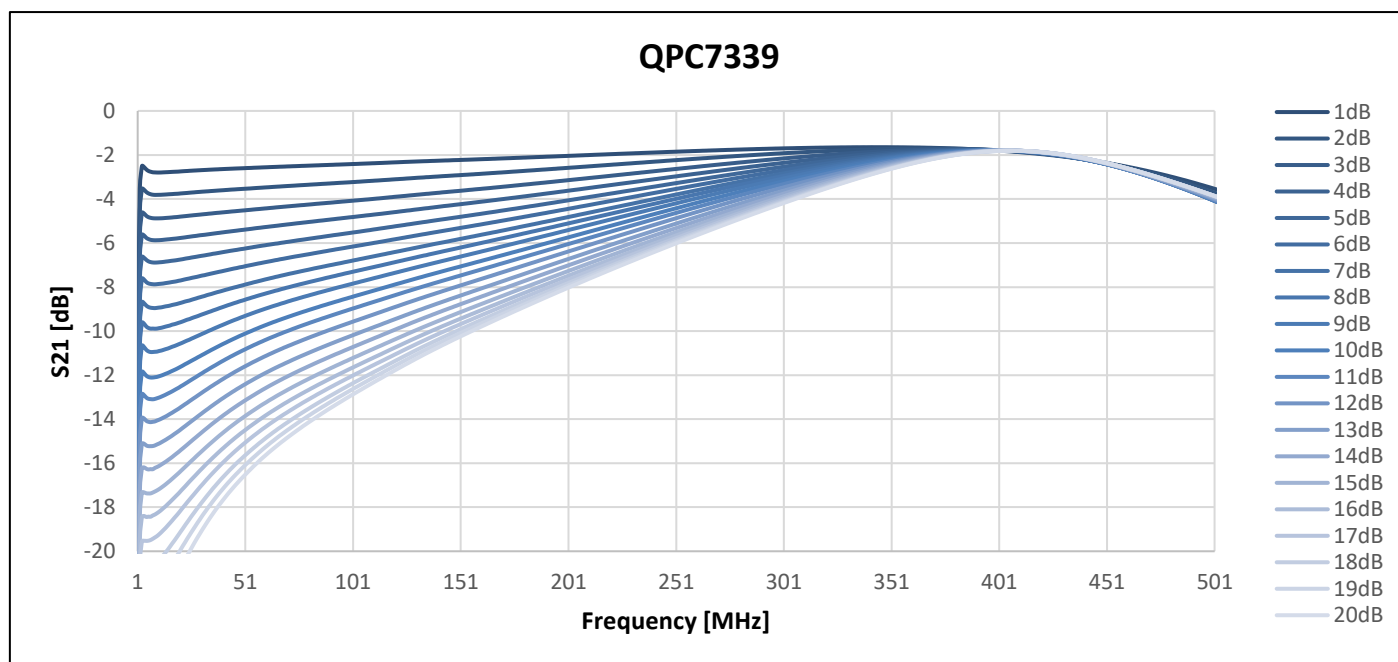
QPC7339

5MHz to 396MHz Variable Cable Slope Equalizer

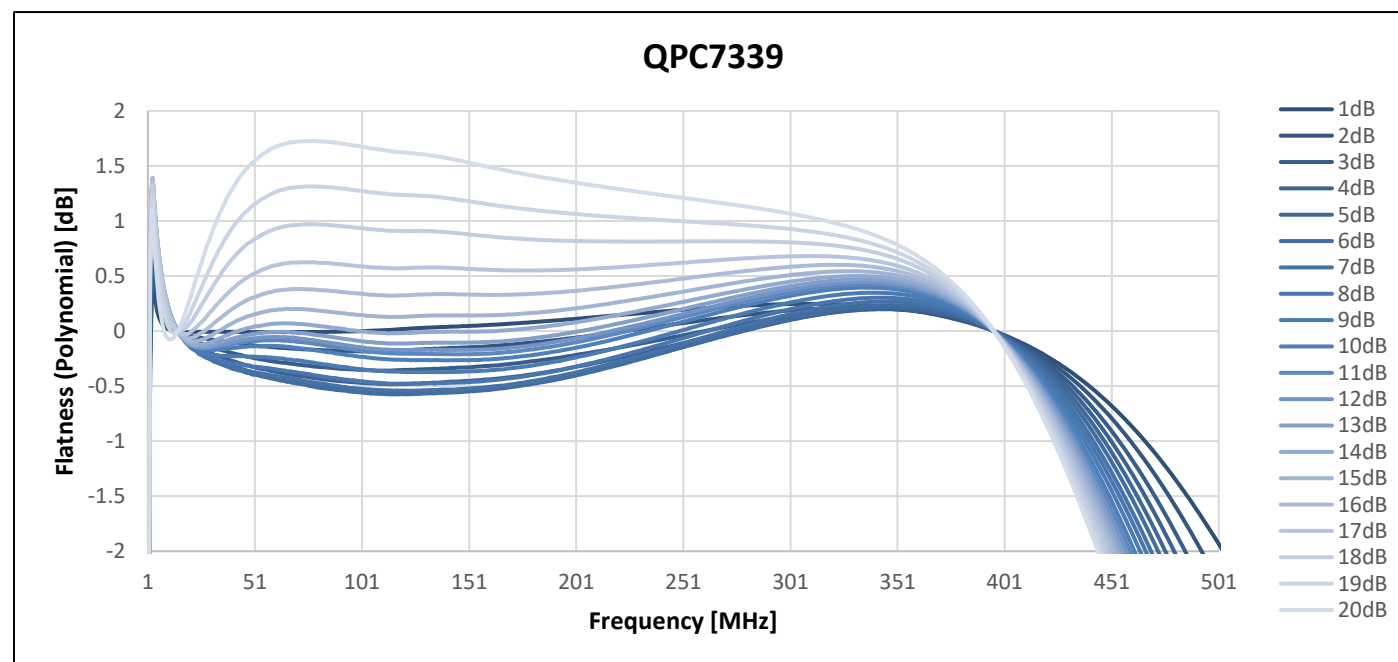
Parameter	Conditions (V _{dd} =5V, T _{MB} =25°C, Z _S =Z _L =75Ω)	Min	Typ	Max	Units
Control					
Control Voltage (V _c) [3], positive slope control gradient	MODE = 0V, minimum slope at V _c = 0V	0	1 to 3	5	V
Control Voltage (V _c) [3], negative slope control gradient	MODE = 5V, minimum slope at V _c = 5V	0	2 to 4	5	V
Control Voltage 2 (V _{c2}) [3], positive slope control gradient	MODE = 0V, minimum slope at V _{c2} = 0V	0	4 to 12	20	V
Control Voltage 2 (V _{c2}) [3], negative slope control gradient	MODE = 5V, minimum slope at V _{c2} = 20V	0	8 to 16	20	V
MODE Pin Logic Low				0.4	V
MODE Pin Logic High		1			V

- Notes:
1. Slope is defined as the difference between the gain at the start frequency and the gain at the stop frequency.
 2. Flatness is defined as sum of positive and negative deviation from a straight line between gain at start frequency and gain at stop frequency.
 3. Either V_c or V_{c2} can be used to set slope, internal 1:4 voltage divider between V_c and V_{c2}.

QPC7339 Slope vs. Frequency, typical (5 to 396MHz)

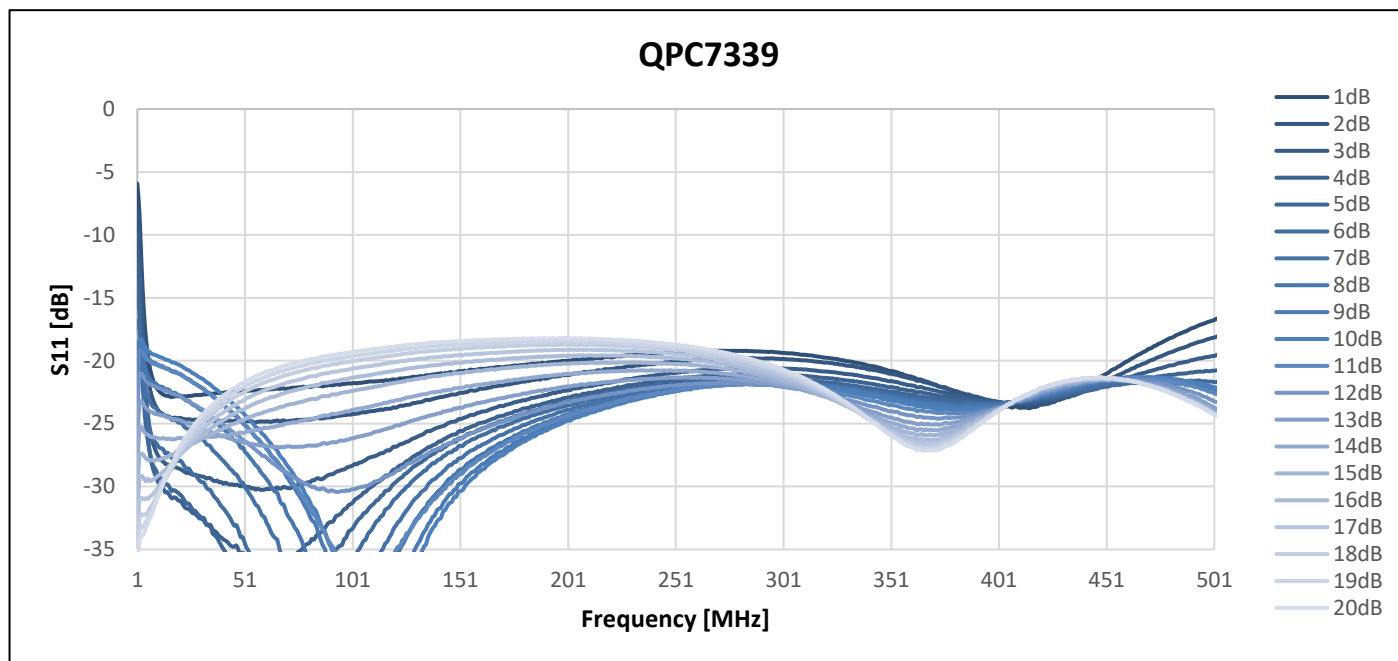


QPC7339 Flatness vs. Frequency, typical (5 to 396MHz)

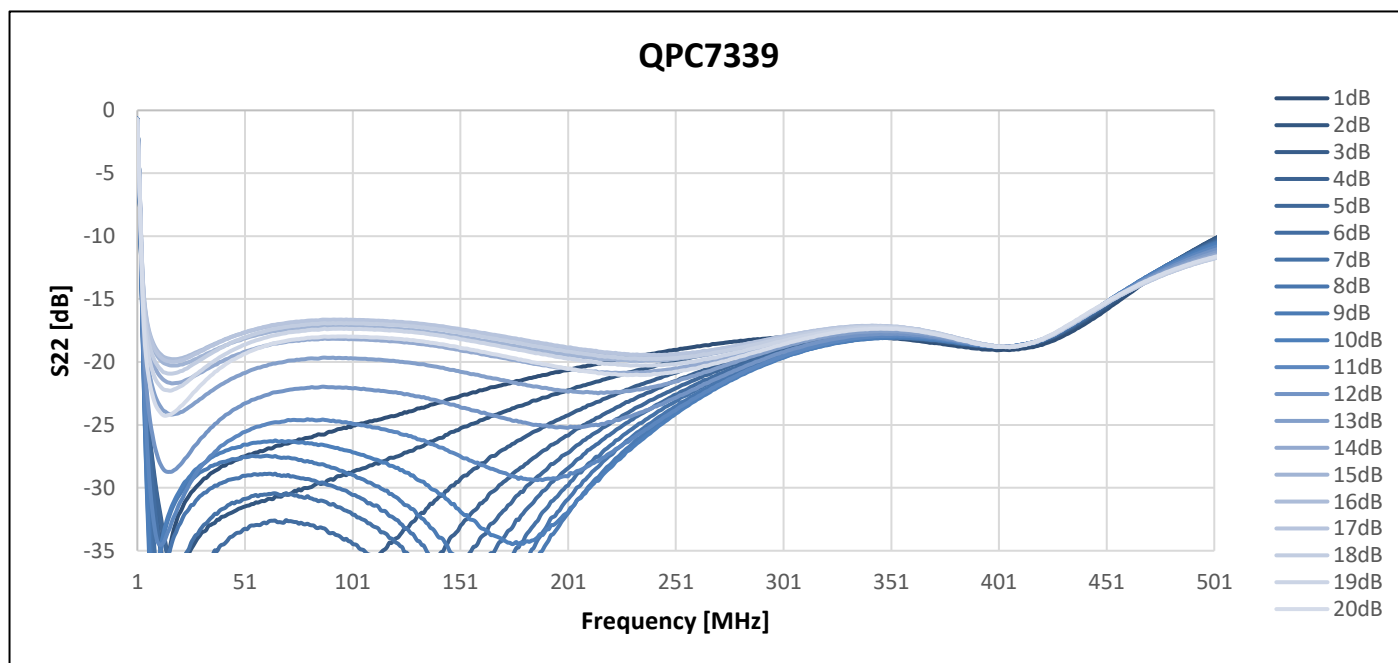


Flatness is measured against a polynomial inverse to the typical cable loss/100ft of $-(0.175 \cdot \sqrt{f[\text{MHz}]} + 0.001 \cdot f[\text{MHz}])$

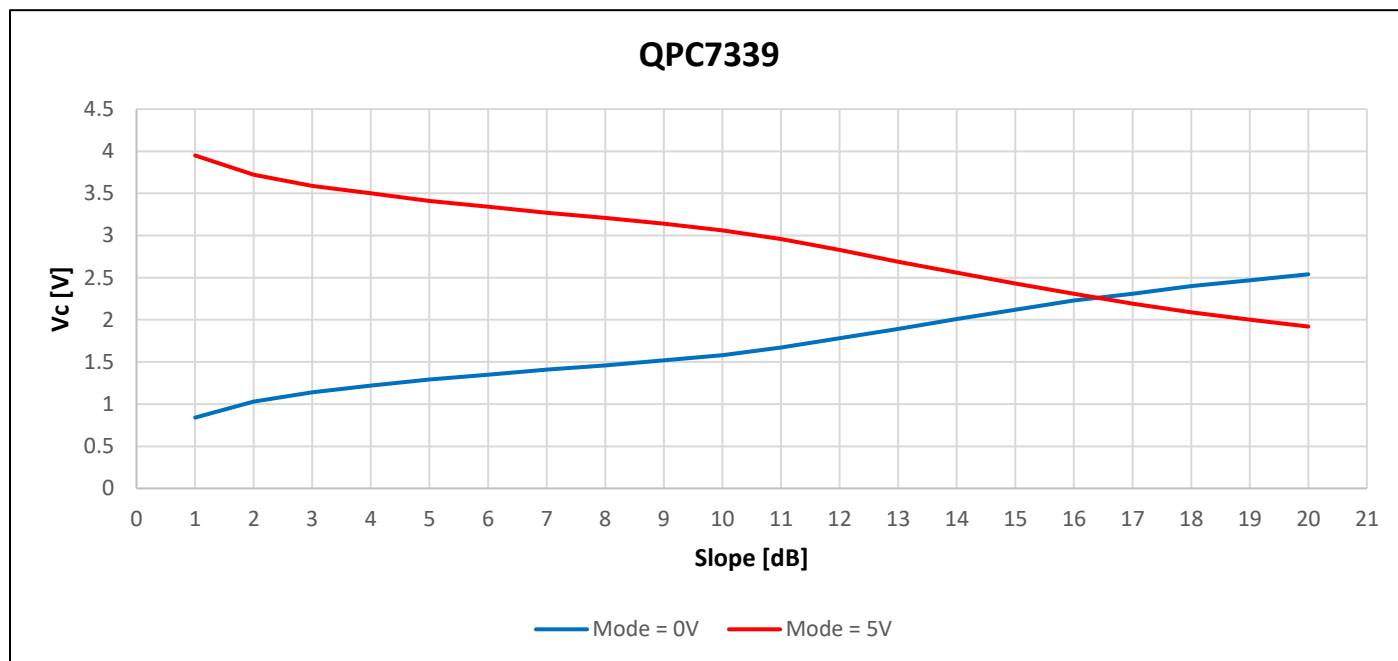
QPC7339 S11 vs. Slope, typical (5 to 396MHz)



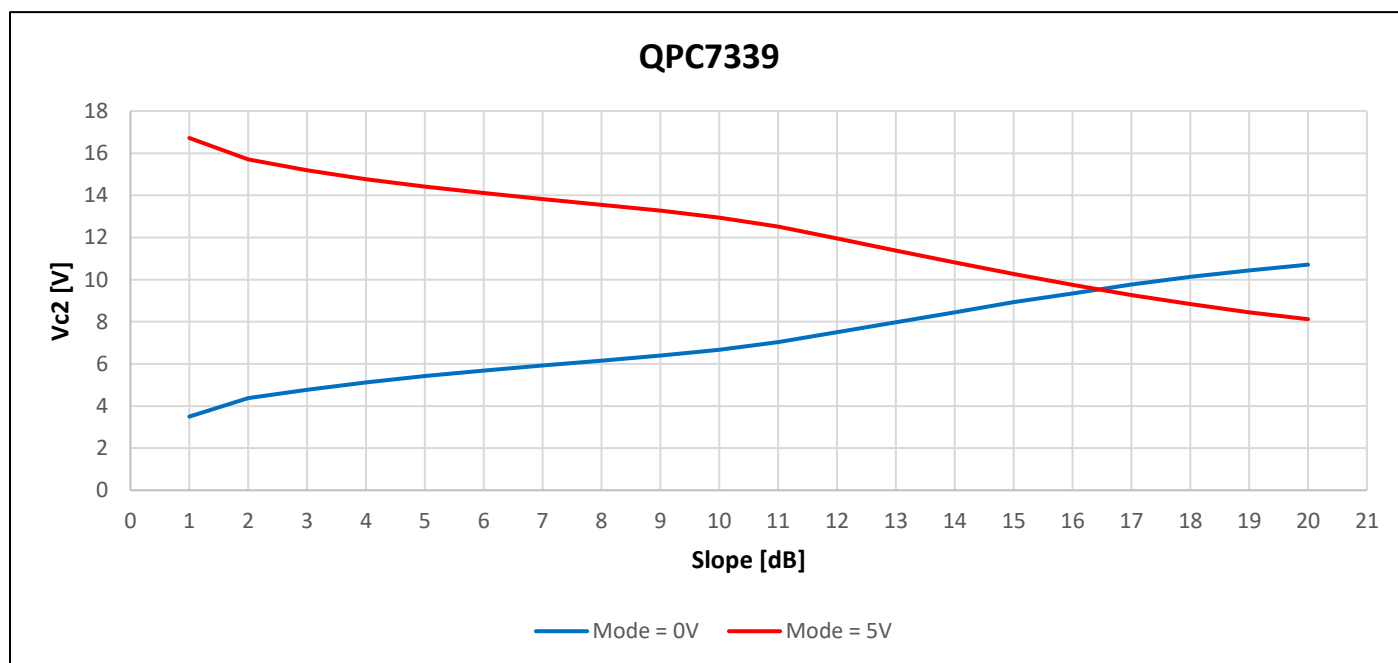
QPC7339 S22 vs. Slope, typical (5 to 396MHz)



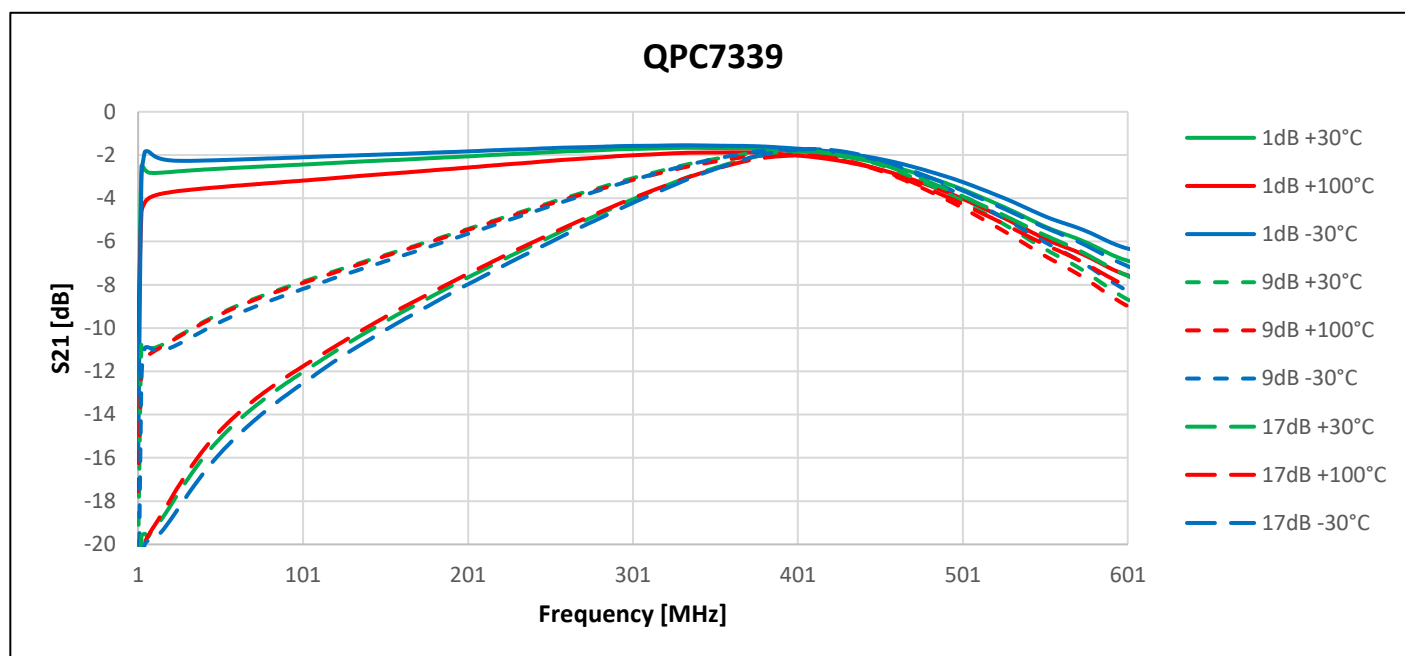
QPC7339 Slope vs. V_c , typical (5 to 396MHz)



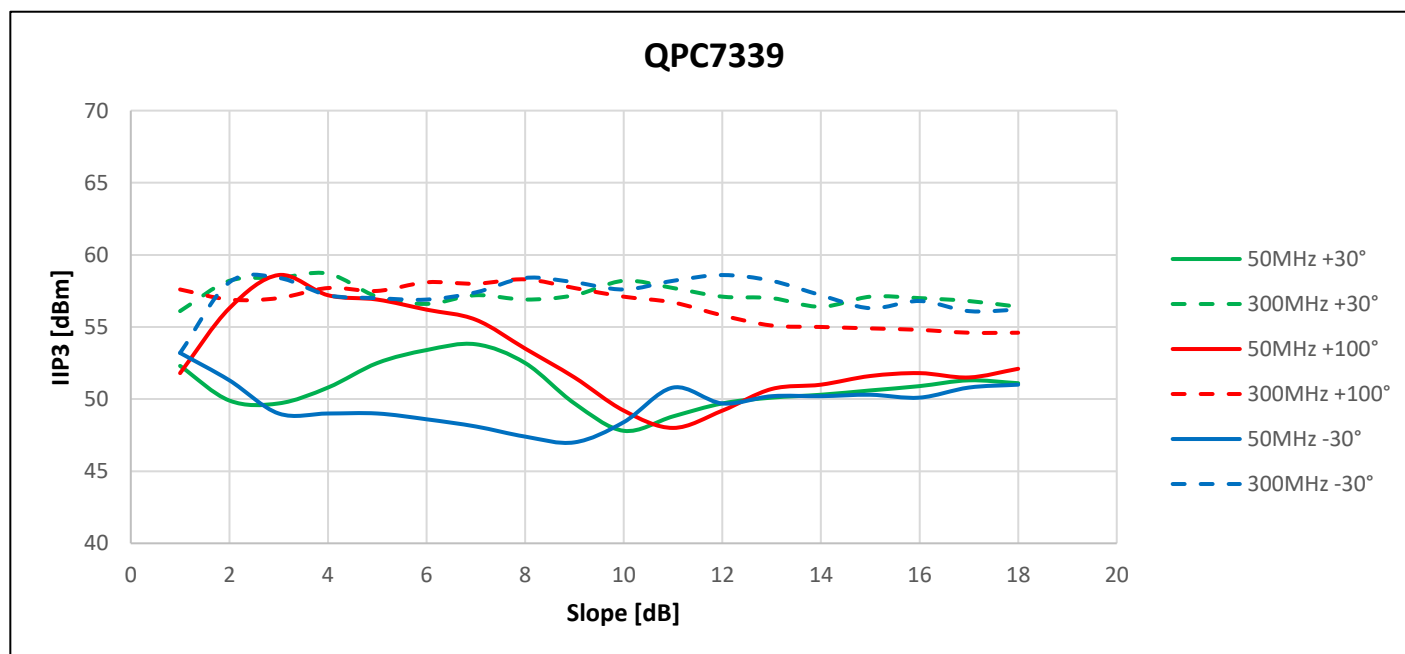
QPC7339 Slope vs. V_{c2} , typical (5 to 396MHz)



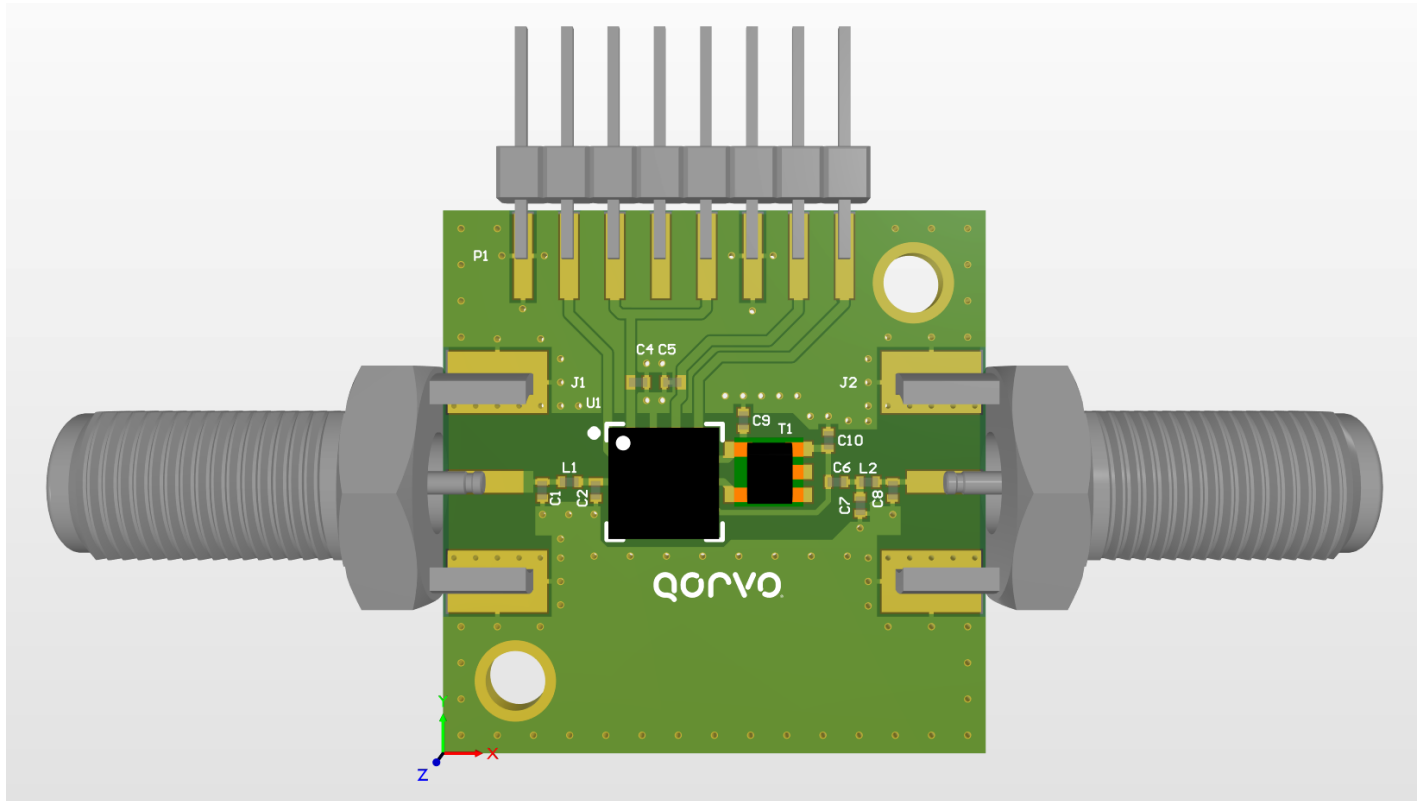
QPC7339 Slope vs. Temperature, typical (5 to 396MHz)



QPC7339 Input IP3 vs. Temperature, typical (5 to 396MHz)

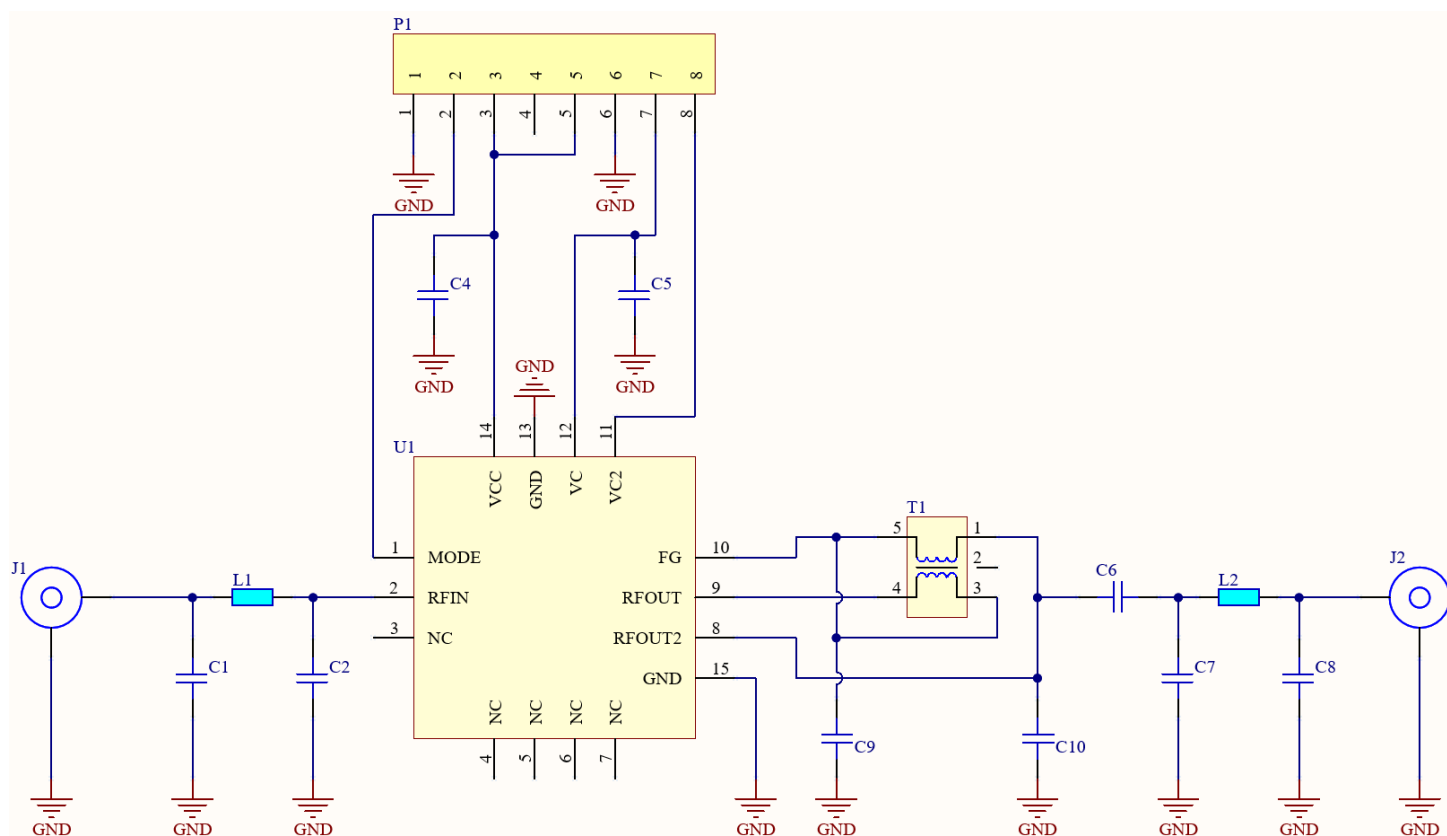


Evaluation Board Assembly Drawing



Evaluation board PCB: FR4, double sided, 1.5mm thickness, 35um Cu
Gerber Files available on request

Evaluation Board Schematic

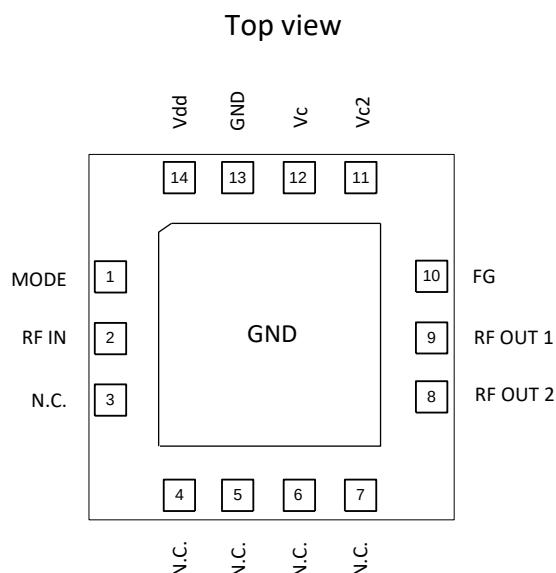


Evaluation Board Bill of Materials (BOM)

Ref. Designator	Value, package	Description	Manufacturer	Part Number
C1	0.5pF	Chip capacitor	MURATA, TAIYO YUDEN	
C2, C9, C8	DNI			
C4, C5	4.7nF	Chip capacitor	MURATA, TAIYO YUDEN	
C10	0.5pF	Chip capacitor	MURATA, TAIYO YUDEN	
C6	1nF	Chip capacitor	MURATA, TAIYO YUDEN	
C7	2pF	Chip capacitor	MURATA, TAIYO YUDEN	
L1, L2	7.5nH	Chip inductor	MURATA, TAIYO YUDEN	
T1		Balun	Mintronix	4813040R
J1, J2		Connector F-type, female	Amphenol	222181
P1		Connector, 2.54mm pin spacing, optional	Various	
U1		Variable equalizer	QORVO	QPC7339

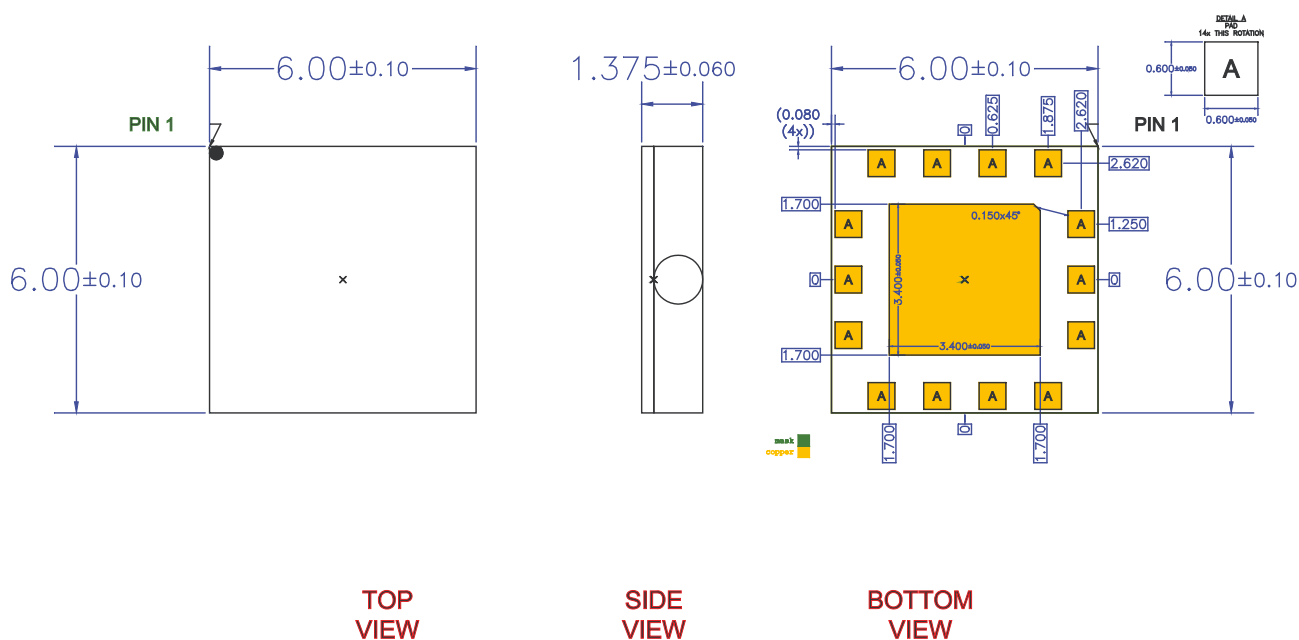
Notes: C1, C7, C8, L1 and L2 may be modified in target application circuit for S11 and S22 optimization

Pin Configuration



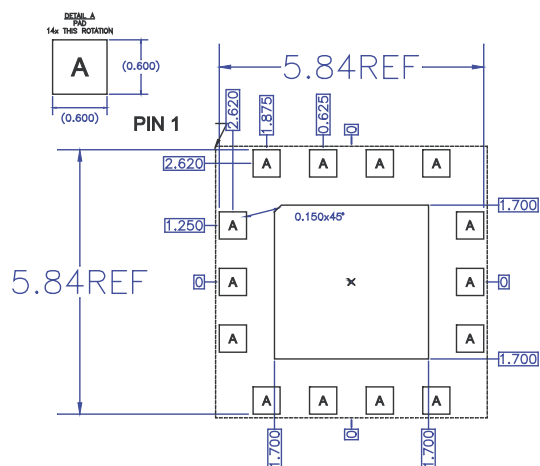
Pin Description

Pin No.	Label	Description
1	MODE	Slope control gradient (0V: positive slope control gradient or 5V: negative slope control gradient)
2	RF IN	RF input signal, AC coupled
8	RF OUT 2	Connection to balun and circuit output
9	RF OUT 1	Connection to balun
10	FG	Floating ground, connection to balun
11	Vc2	Control voltage 2
12	Vc	Control voltage
13	GND	Ground
14	Vdd	+5V supply voltage
Pkg Base	GND	Ground connection. The back side of the package should be connected to the ground plane though as short of a connection as possible. PCB vias under the device are recommended.
3, 4, 5, 6, 7	N.C.	Not connected

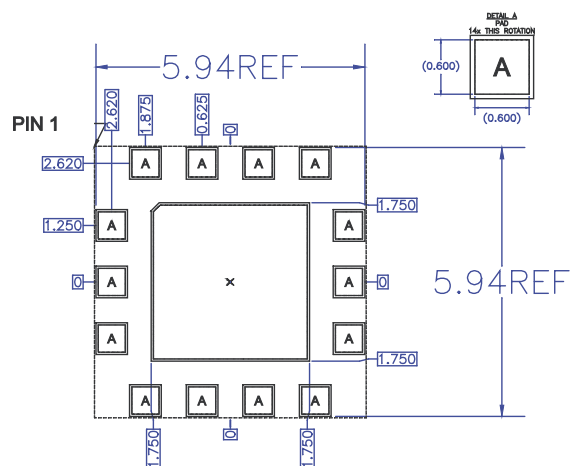
Package Outline Drawing (Dimensions in millimeters)

Notes:

1. Dimension and tolerance formats conform to ASME Y14.5M-1994.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Co-planarity applies to the exposed ground/thermal pad as well as the contact pins.
4. Package body length/width does not include plastic flash protrusion across mold parting line.

PCB Metal Land Pattern (Dimensions in millimeters)



RECOMMENDED LAND PATTERN



RECOMMENDED LAND PATTERN MASK

All dimensions are in millimeters. Angles are in degrees.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	2	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes.

Solder profiles available upon request.

contact plating: ENEPIG (NiPdAu)

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

Important Notice

The information contained in this Data Sheet and any associated documents ("Data Sheet Information") is believed to be reliable; however, Qorvo makes no warranties regarding the Data Sheet Information and assumes no responsibility or liability whatsoever for the use of said information. All Data Sheet Information is subject to change without notice. Customers should obtain and verify the latest relevant Data Sheet Information before placing orders for Qorvo® products. Data Sheet Information or the use thereof does not grant, explicitly, implicitly or otherwise any rights or licenses to any third party with respect to patents or any other intellectual property whether with regard to such Data Sheet Information itself or anything described by such information.

DATA SHEET INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Without limiting the generality of the foregoing, Qorvo® products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death. Applications described in the Data Sheet Information are for illustrative purposes only. Customers are responsible for validating that a particular product described in the Data Sheet Information is suitable for use in a particular application.

© 2020 Qorvo US, Inc. All rights reserved. This document is subject to copyright laws in various jurisdictions worldwide and may not be reproduced or distributed, in whole or in part, without the express written consent of Qorvo US, Inc. | QORVO® is a registered trademark of Qorvo US, Inc.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Qorvo:](#)

[QPC7339PCBA-410](#) [QPC7339TR7](#)