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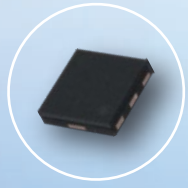
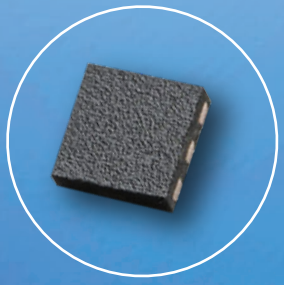
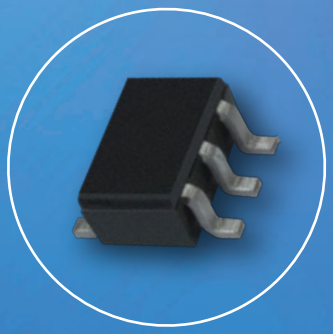
CEL California Eastern Laboratories

2013-2014

RF & Wireless Semiconductors







RENESAS

CEL California Eastern Laboratories

California Eastern Laboratories (CEL) is the exclusive sales and marketing partner in the Americas for products made by the Compound Semiconductor Devices Business Division (CSDBD) of Renesas Electronics Corporation, formerly NEC Electronics Corporation. CSDBD products include RF components, optocouplers, solid state relays, and lasers and detectors for fiber optics.

CEL serves designers, OEMs and contract manufacturers in the RF & Wireless, Mobilecomm, Multimedia, Broadband Communications, Industrial Control, and Automated Test Equipment (ATE) markets. With over 50 years experience in high frequency design, customer support and fulfillment, CEL is ideally positioned to provide its customers with solutions tailored to meet their specific needs.

CEL also maintains extensive inventories and provides engineering and applications assistance at its technical centers in Santa Clara, CA. and Wauconda, IL. The company supports customers through sales offices, sales representatives and distributors in numerous locations.

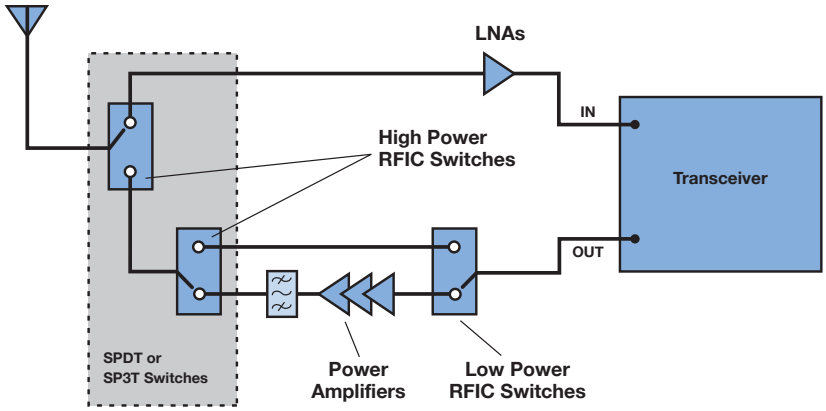
PRODUCTS by APPLICATION

PRODUCT SPECIFICATIONS

S-Parameters, SPICE Models, App Notes, Data Sheets, and more are available at *cel.com/rf*

Front End Components for UHF to 2.5 GHz Applications

Wi-Fi • Bluetooth • ZigBee • Automated Meter Reading • Mesh & Home Area Networks • ISM Band applications



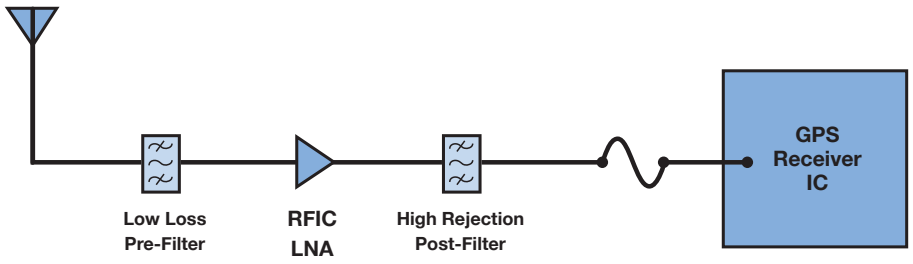
MMIC & Transistor Power Amplifiers		450 MHz	915 MHz	2.4 GHz
UPG2118K	+31.5 dBm Three Stage GaAs MMIC	✔	✔	✔
NE5500234	Silicon LD-MOSFET: 32.5 dBm POUT typ	✔	✔	
NE5511279A	Silicon LD-MOSFET: 40 dBm POUT typ	✔	✔	
NE5531079A	Silicon LD-MOSFET: 40 dBm POUT typ	✔	✔	
NESG250134	0.8 Watt SiGe HBT	✔	✔	
NESG260234	1 Watt SiGe HBT	✔	✔	
NESG270034	2 Watt SiGe HBT	✔	✔	
NE5520379A	3 watt LDMOS FET: 35.5 dBm POUT typ	✔	✔	
NE664M04	0.4 Watt Silicon Bipolar Transistor Driver	✔	✔	✔
NE5520279A	LDMOS FET: 32 dBm POUT typ	✔	✔	✔
NESG2101M05	120 mW SiGe Bipolar Transistor Driver	✔	✔	✔
Medium & High Power GaAs RFIC Switches				
UPD5902T7K	SPDT, single control, high power handling	✔	✔	✔
UPG2155TB	SPDT, low harmonics, ideal for high power applications	✔	✔	✔
UPG2409TB/T6X	SPDT, high power, high isolation	✔	✔	✔
UPG2415TK/T6X	SPDT, high power, high isolation	✔	✔	✔
UPG2009TB	SPDT, high power, high linearity, *no compromise* performance	✔	✔	✔
UPG2422TK	SPDT, great all-around med power device, in mini flat-lead pkg	✔	✔	✔
UPG2179TB	SPDT, industry's best low cost, med power switch, industry standard pkg	✔	✔	✔
UPG2406TK/T6R	SPDT, medium power, choice of packages	✔	✔	✔
UPG2404T6Q	SP3T, high power, ideal for triple mode cellular phone, NFC	✔	✔	
UPG2405T6Q	SP3T, miniature package for Bluetooth, WLAN, NFC	✔	✔	✔
UPG2413T6M/T6Z	SP3T, medium power, low insertion loss, low profile package	✔	✔	✔
UPG2150T5L	SP3T, 35 dB isolation between WLAN & Bluetooth ports		✔	✔
Low Power CMOS & GaAs RFIC Switches				
UPG2179TB	SPDT, industry's best low cost, med power switch, industry standard pkg	✔	✔	✔
UPD5713TK	Low cost CMOS SPDT, single control, low profile package	✔	✔	
UPG2159T6R	SPDT, low insertion loss, high isolation, 1.8 or 3 V	✔	✔	✔
UPG2214TB/TK	Low cost GaAs SPDT, performance guaranteed at 1.8 & 3.0 Volts	✔	✔	✔

Front End Components for UHF to 2.5 GHz *continued*

MMIC & Transistor LNAs (Performance @ 1 GHz)		450 MHz	915 MHz	2.4 GHz
UPD5740T6N	Wideband CMOS LNA IC with bypass for mobile DTV	✔	✔	
UPC3237TK	SiGe:C RFIC: 1.4 dB NF, 15.3 dB Gain, for DTV	✔	✔	
NE662M04	Silicon Bipolar Transistor: 1.0 dB NF, 21 dB Gain	✔	✔	✔
NESG3031M05/M14	SiGe Bipolar Transistor: 0.6 dB NF, 16 dB Gain		✔	✔
UPC8233TK	SiGe:C RFIC: 0.95 dB NF, 20 dB Gain, 1.8V V_{CC}		✔	✔
NESG3032M14	SiGe Bipolar Transistor: 0.6 dB NF, 17.5 dB Gain		✔	✔
NESG3033M14	SiGe Bipolar Transistor: 0.6 dB NF, 17.5 dB Gain, ESD protection		✔	✔
NE3508M04	GaAs FET: 0.4 dB NF, 14 dB Gain, high linearity			✔
NE3509M04	GaAs FET: 0.4 dB NF, 18dB Gain, high gain			✔

External LNAs for GPS

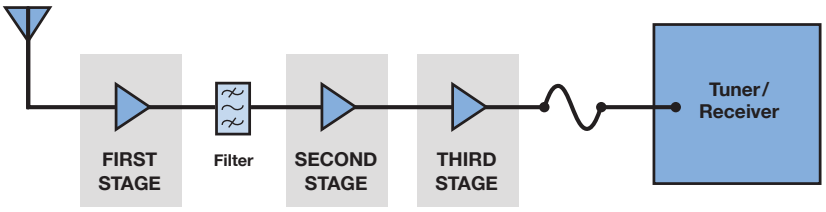
External LNAs reduce front-end noise and improve receiver sensitivity. Combined with tuning and distributed filtering they can improve noise performance by more than 1.5 dB over on-chip LNAs.



SiGe & SiGe:C RFIC LNAs								
Part Number	**Description**	**Supply Voltage (V)**	**I_{CC} (mA)**	**Noise Figure (dB)**	**Gain (dB)**	**IIP_3 (dBm)**	**Total External Components Req'd**	**Package**
UPC8231TK	Low noise & current, high gain	3.0	3.8	0.80	20	-10	9	TK
UPC8233TK	Low voltage, current & noise, high gain	2.7	3.5	0.90	20	-8.5	8	TK
UPC8236T6N	Low voltage, noise & distortion, highly integrated	2.7	6.5	0.80	19.5	-3	5	T6N low profile
UPC8240T6N	Low voltage & noise, high gain, highly integrated	2.7	6.5	1.0	28	-21.5	5	T6N low profile

LNAs for L to C-Band Applications

First, second and third stage devices for applications from 1 to 8 GHz



LNAs by Application

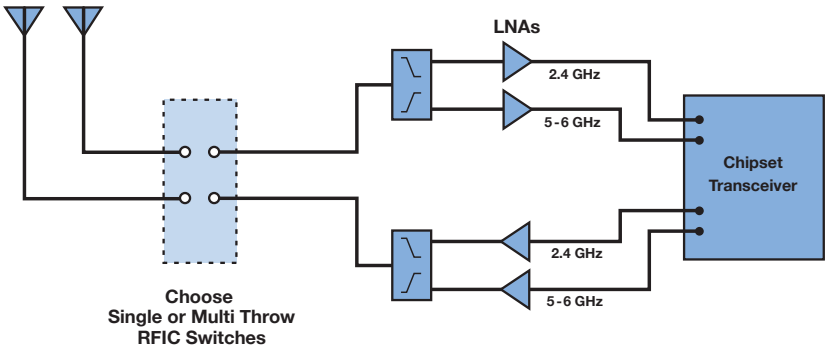
Application	Frequency	FIRST STAGE	SECOND STAGE	THIRD STAGE
GPS	1.575 GHz	❊ UPC8211TK, UPC8231TK, UPC8233TK, UPC8236T6N, UPC8240T6N		
		NESG3032M14 NE3509M04/M14 NESG2031M05	NE662M04 NESG2031M05	
Satellite Radio and DAB	1.4 – 2.35 GHz	NE3508M04 NE3509M04 NE3509M14 NE3510M04	NE3508M04 NESG2101M05 NESG2031M05 NESG3031M05 NESG7030M04 NESG3032M14 NE662M04	NE3508M04 NESG2101M05
WLAN, Wi-Fi, Cordless Phone	2.4 GHz	NESG2031M05 NESG3031M05 NESG3032M14 NESG3033M14	NESG2031M05 NESG3031M05 NESG3032M14 NESG3033M14	
WLAN, Wi-Fi, Cordless Phone	5 – 6 GHz	NESG7030M04	NESG7030M04	

LNA Performance *(see Data Tables for additional specifications)*

Part Number	Description	NF (dB)	Gain (dB)	P1dB (dBm)	Package
❊ **Low Noise, High Gain Silicon RFIC LNAs** *(specified @ 1.575 GHz)*					
UPC8211TK	SiGe RFIC	1.3	18.5	-24	TK
UPC8231TK	SiGe:C RFIC	0.8	20.0	-22	TK
UPC8233TK	SiGe:C RFIC	0.95	20.0	-23	TK
UPC8236T6N	SiGe:C RFIC	0.8	19.5	-18	T6N
UPC8240T6N	SiGe:C RFIC	1.0	28.0	-22.5	T6N
NE3508M04	GaAs HJ-FET	0.40 @ 2.0 GHz	14.0 @ 2.0 GHz	+18.0	M04
NE3509M04	GaAs HJ-FET	0.40 @ 2.0 GHz	17.5 @ 2.0 GHz	+14.0	M04 or M14
NE3510M04	GaAs HJ-FET	0.35 @ 2.0 GHz	19.0 @ 2.0 GHz	+12.0	M04 or M14
NE662M04	Silicon Transistor	1.1 @ 2.0 GHz	16.0 @ 2.0 GHz		M04
NESG2021M05	SiGe Transistor	0.9 @ 2.0 GHz	18 @ 2.0 GHz	+9	M05 or M16
NESG2031M05	SiGe Transistor	0.8 @ 2.0 GHz	17 @ 2.0 GHz	+13	M05
NESG2101M05	SiGe Transistor	0.9 @ 2.0 GHz	13 @ 2.0 GHz	+21	M05
NESG3031M05/M14	SiGe Transistor	0.6 @ 2.4 GHz	16 @ 2.4 GHz	+13	M05 or M14
NESG3032M14	SiGe Transistor	0.6 @ 2.0 GHz	17.5 @ 2.0 GHz	+12.5	M14
NESG3033M14	SiGe Transistor	0.6 @ 2.0 GHz	17.5 @ 2.0 GHz	+12.5	M14
NESG7030M04	SiGe:C Transistor	0.75 @ 5.8 GHz	14 @ 5.8 GHz	+4.5	M04

2.4 & 5.8 GHz WLAN / Wi-Fi / WiMAX Devices

Single and multi-throw switches, transistor, RFICs, discrete Silicon and GaAs low noise amplifiers designed specifically for Dual Band WLAN and WiMAX.



GaAs RFIC Switches to 2.5 GHz — Single & Multi Throw	
UPG2179TB	SPDT, 0.3 dB Insertion Loss @ 2 GHz, industry-standard package
UPG2406T6R	SPDT, 0.45 dB Insertion Loss @ 2 GHz, +22.0 dBm $P_{IN(0.1dB)}$ @ +1.8 V_{CONT}
UPG2406TK	SPDT, 1.8 or 2.7V control voltage, 0.45 dB Insertion Loss @ 2 GHz
UPG2150T5L	SP3T, 0.5 dB Insertion Loss, 35 dB Isolation between ports @ 2.5 GHz
UPG2405T6Q	SP3T, 0.60 dB Insertion Loss, 20 dB Isolation @ 2.5 GHz
UPG2413T6M	SP3T, 0.5 dB Insertion Loss, 18 dB Isolation @ 2.5 GHz, 2 mm package
UPG2413T6Z	SP3T, 0.5 dB Insertion Loss, 18 dB Isolation @ 2.5 GHz, 1.5 mm package
UPG2430T6Z	SP3T, 0.55 dB Insertion Loss, 28 dB Isolation @ 2.5 GHz, 1.5 mm package
GaAs RFIC Switches – Broadband to 6 GHz	
UPG2185T6R	SPDT, Insertion Loss: 0.4 dB @ 2.5 GHz, 0.5 dB @ 6 GHz, 25 dB Isolation @ 6 GHz
UPG2163T5N	SPDT, Insertion Loss: 0.4 dB @ 2.4 GHz, 0.5 dB @ 6 GHz
UPG2422TK	SPDT for Dual Band WLAN, very cost-effective
UPG2176T5N	SPDT 2.4 – 6 GHz, Insertion Loss: 0.5 dB @ 2.4 GHz, 0.7 dB @ 5.5 GHz, internal termination
UPG2415TK / T6X	SPDT for Dual Band WLAN, high power, low insertion loss for Access Point applications
UPG2409T6X	SPDT 2.0 – 6.0 GHz, Insertion Loss: 0.45 dB @ 2.5 GHz, 0.65 dB @ 6.0 GHz
UPG2409TB	SPDT 2.0 – 4.0 GHz, Insertion Loss: 0.45 dB @ 2.5GHz, 0.6 dB @ 3.8 GHz
UPG2164T5N	DPDT, Insertion Loss: 0.5 dB @ 2.4 GHz, 0.7 dB @ 5.5 GHz
UPG2162T5N	DPDT, Insertion Loss: 0.6 dB @ 2.4 GHz, 0.85 dB @ 5.5 GHz, 27 dB Isolation @ 6 GHz
UPG2430T6Z	SP3T, Insertion Loss: 0.65 dB @ 6 GHz; 25 dB Isolation @ 6 GHz
LNAs	
NESG7030M04	SiGe:C HBT, 0.75dB Noise Figure, 14 dB Gain @ 5.8GHz, built-in ESD protection
NESG3031M05 / M14	SiGe HBT, 1.1 dB Noise Figure, 9.5 dB Gain @ 2.4 GHz
NESG3032M14	SiGe HBT, 0.6 dB Noise Figure, 17.5 dB Gain @ 2.0 GHz
NESG3033M14	SiGe HBT, 0.6 dB Noise Figure, 17.5 dB Gain @ 2.0 GHz, built-in ESD protection
NE3509M04	GaAs HJ FET, super low 0.40dB noise figure, 17 dB gain @ 2.5 GHz

SPDTs (Single Pole Double Throw)

Part Number	TYPICAL ELECTRICAL CHARACTERISTICS (T_A = 25°C)						Package Code	Description
	Frequency (GHz, max)	Control Voltages (V)	Insertion Loss (dB)	Isolation (dB)	Input Power @ 0.1 dB compression point (dBm)	Input Power @ 1.0 dB compression point (dBm)		
UPD5713TK	2.5	+1.8, 2.8/0	0.80 @ 2 GHz	25 @ 2 GHz	+17	+21	TK	Single Control (1.8-Vdd), small size package, CMOS
UPD5902T7K*	**6.0**	**+1.3, 2.5/0**	**0.40 @ 2 GHz 0.60 @ 6 GHz**	**37 @ 2 GHz 23 @ 6 GHz**	**+38**	**–**	**T7K**	**Single Control (1.3V-Vdd), High RF Power, no blocking caps needed, CMOS**
UPG2009TB	3.0	+2.8/0	0.30 @ 2 GHz	28 @ 2 GHz	+34	–	TB	High power handling, low insertion loss, high isolation
UPG2030TK	3.0	+2.8/0	0.30 @ 2 GHz	27 @ 2 GHz	+27	+30	TK	Medium power, small size package
UPG2155TB*	**2.5**	**+2.6/0**	**0.40 @ 2 GHz**	**19 @ 2 GHz**	**+37**	**–**	**TB**	**High power handling, low harmonics, lowest cost high power switch**
UPG2159T6R*	**3.0**	**+1.8, 2.7/0**	**0.23 @ 2 GHz**	**27 @ 2 GHz**	**+22**	**+25.5**	**T6R**	**Lowest insertion loss, high isolation, 1mm pacakge, 1.8V-3.3V.**
UPG2163T5N	8.0	+3.0/0	0.4 @ 2.5 GHz 0.5 @ 6 GHz	35 @ 2.5 GHz 30 @ 6 GHz	–	+35 @ 2.5 GHz +29 @ 6 GHz	T5N	Highest isolation, great 2.4 and 6GHz performance
UPG2176T5N*	**6.0**	**+3.0/0**	**0.55 @ 3.5 GHz**	**24 @ 3.5 GHz**	**–**	**+37**	**T5N**	**Absorptive, high power and high linearity to 6GHz**
UPG2179TB*	**3.0**	**+3.0/0**	**0.30 @ 2 GHz**	**27 @ 2 GHz**	**+29**	**+32**	**TB**	**Best in class medium power, for WiFi + general purpose to 3GHz**
UPG2185T6R*	**6.0**	**+1.8, 3.0/0**	**0.55 @ 3.5 GHz 0.5 @ 6 GHz**	**26 @ 2.5 GHz 25 @ 6 GHz**	**+29**	**+30.5**	**T6R**	**Best 1mm SPDT for 6GHz WiFi and high frequency applications, 1.8V-3.6V**
UPG2214TB	3.0	+1.8, 3.0/0	0.30 @ 2 GHz	27 @ 2 GHz	+23	+20 (1.8 V), 26 (3.0 V)	TB	Low insertion loss, high isolation, medium power, 1.8V-5.3V.
UPG2214TK*	**3.0**	**+1.8, 3.0/0**	**0.30 @ 2 GHz**	**27 @ 2 GHz**	**+23**	**+20 (1.8 V), 26 (3.0 V)**	**TK**	**Small size package, low inseriton loss, high isolation, medium power, 1.8V-5.3V.**
UPG2406TK	3.0	+1.8, 2.7/0	0.45 @ 2 GHz	19 @ 2 GHz	+29	+25 (1.8 V), 30.5 (3.0 V)	TK	Small size package, cost effective medium power, 1.8V-5.3V
UPG2406T6R	3.0	+1.8, 2.7/0	0.45 @ 2 GHz	19 @ 2 GHz	+29	+30.5	T6R	1mm package, for 2.4GHz WiFi and general applications to 3GHz. 1.8V-3.3V
UPG2408TK	3.0	+3.0/0	0.48 @ 2 GHz	19 @ 2 GHz	+29	–	TK	Small size package, cost effective medium power
UPG2409TB	3.8	+3.0/0	0.45 @ 2.5 GHz 0.60 @ 3.8 GHz	26 @ 2.5 GHz 19 @ 3.8 GHz	+33.5	+35	TB	High power, for Access Points to 3.8GHz
UPG2409T6X	6.0	+3.0/0	0.45 @ 2.5 GHz 0.65 @ 6 GHz	30 @ 2.5 GHz 27 @ 6 GHz	+34	+36	T6X	High power, for Access Points to 6GHz, 1.5mm QFN package
UPG2415TK*	**6.0**	**+3.0/0**	**0.45 @ 2.5 GHz 0.65 @ 6 GHz**	**28 @ 2.5 GHz 26 @ 6 GHz**	**+31**	**+34**	**TK**	**High power handling for Access Points to 6GHz, small size package**
UPG2415T6X*	**6.0**	**+3.0/0**	**0.45 @ 2.5 GHz 0.55 @ 6 GHz**	**28 @ 2.5 GHz 26 @ 6 GHz**	**+31**	**+35**	**T6X**	**High power handling for Access Points to 6GHz, 1.5mm QFN package**
UPG2419T6R	6.0	+3.0/0	0.45 @ 5GHz	17-26 @ 5GHz	–	+24	T6R	For TransferJet, 1mm package
UPG2422TK*	**6.0**	**+1.8, 3.0/0**	**0.35 @ 2.5GHz, 0.55 @ 6GHz**	**28 @ 2.5GHz 24 @ 6GHz**	**+28 @ 2-6GHz**	**+31 @ 6GHz**	**TK**	**Best medium power, small size package, low inseriton loss, high isolation, 1.8V-5.3V**

BOLD* = Most Popular / Most Highly Recommended Switches

SP3Ts (Single Pole Three Throw)

Part Number	TYPICAL ELECTRICAL CHARACTERISTICS (T_A = 25°C)						Package Code	Description
	Frequency (GHz, max)	Control Voltages (V)	Insertion Loss (dB)	Isolation (dB)	Input Power @ 0.1 dB compression point (dbm)	Input Power @ 1.0 dB compression point (dBm)		
UPG2150T5L	3.0	+2.85/0	0.50@2.5GHz	35 @ 2.5GHz	NA	+25 +31	T5L	Extra high isolation, for 2.4GHz WiFi + Bluetooth
UPG2404T6Q	2.5	+2.8/0	0.55 @ 2GHz	21 @ 2GHz	+33	–	T6Q	High power handling, low harmonics
UPG2405T6Q	2.5	+2.8/0	0.60 @ 2.5GHz	20 @ 2.5 GHz	+31	–	T6Q	Medium power handling, low harmonics
UPG2413T6M	3.0	+3.0/0	0.4 @ 1GHz 0.5 @ 2.5GHz	26 @ 1GHz 18 @ 2.5GHz	+28	+33	T6M	Medium power, low insertion loss for WiFi + general apps, 2mm package, 1.8V-3.6V
UPG2413T6Z	3.0	+3.0/0	0.4 @ 1GHz 0.5 @ 2.5GHz	26 @ 1GHz 18 @ 2.5GHz	+28	+31	T6Z	Medium power, low insertion loss for WiFi + general apps, 1.5mm package, 1.8V-3.6V
UPG2417T6M	0.136	+2.85/0	0.5 @ 13.56GHz	50 @ 13.56GHz	+32	–	T6M	For 13.56MHz NFC / Wireless Charging antenna tuning, 1.5V-3.6V
UPG2430T6Z*	**6.0**	**+3.0/0 +1.8/0**	**0.65 @ 6GHz**	**25 @ 6GHz**	**+28 +23**	**+31 +25**	**T6Z**	**Best SP3T for dual-band WiFi and general high frequency apps, 1.6V-3.6V**

BOLD* = Most Popular / Most Highly Recommended Switches

SP4Ts (Single Pole Four Throw)

Part Number	TYPICAL ELECTRICAL CHARACTERISTICS (T_A = 25°C)						Package Code	Description
	Frequency (GHz, max)	Control Voltages (V)	Insertion Loss (dB)	Isolation (dB)	Input Power @ 0.1 dB compression point (dBm)	Input Power @ 0.1 dB compression point (dBm)		
UPD5731T6M	2.0	+2.8/0	1.3 @2GHz	26 @ 2GHz	+17	+20	T6M	Only two control pins, low frequency operation, CMOS, 1.5V-3.6V.
UPD5904T7K*	**6.0**	**+2.5**	**0.5 @ 2GHz 0.75 @ 6GHz**	**30 @ 2GHz 20 @ 6GHz**	**+38**	**–**	**T7K**	**High power, only two control pins (1.8V-Vdd) no blocking caps needed, CMOS**

BOLD* = Most Popular / Most Highly Recommended Switches

DPDTs (Double Pole Double Throw)

Part Number	TYPICAL ELECTRICAL CHARACTERISTICS (T_A = 25°C)						Package Code	Description
	Frequency (GHz, max)	Control Voltages (V)	Insertion Loss (dB)	Isolation (dB)	Input Power @0.1 dB compression point (dBm)	Input Power @1.0 dB compression point (dBm)		
UPD5738T6N	2.5	+2.8/0	0.8 @ 1GHz	22 @ 1GHz	+15	+20	T6N	Only one control pin, low frequency operation, CMOS, 1.5V-3.6V
UPG2162T5N	6.0	+3.0/0	0.6 @ 2.4GHz 0 .85 @ 5.5GHz	30 @ 2.4GHz 27 @ 5.5 GHz	–	+31 +29	T5N	Best isolation of all DPDTs, up to 6GHz operation
UPG2164T5N*	**6.0**	**+3.0/0**	**0.5 @ 2.4GHz 0.7 @ 5.5GHz**	**25 @ 2.4GHz 17 @ 5.5GHz**	**–**	**+31 +29**	**T5N**	**Lowest cost, lowest insertion loss DPDT. 6GHz operation.**

BOLD* = Most Popular / Most Highly Recommended Switches

Low Noise GaAs FETs, 1 to 20 GHz Typical Specifications @ T_A = 25°C

Part Number	Gate Length (μm)	Gate Width (μm)	Recommended Frequency Range (GHz)	Test Frequency (GHz)	NF/G_A Bias		NF_{OPT} (dB)	G_A (dB)	Power Bias		P_{1dB} (dBm)	Chip / Package Code	Chip / Package Description
					V_{DS} (V)	I_{DS} (mA)			V_{DS} (V)	I_{DS} (mA)			
NE3503M04	0.2	160	2 to 18	12	2.0	10	0.55	11.5	—	—	—	M04	Plastic SMD
NE3508M04	0.6	800	1 to 6	2	2.0	10	0.40	14.0	3.0	30	+18.0	M04	Plastic SMD
NE3509M04	0.6	400	1 to 6	2	2.0	10	0.45	17.5	3.0	20	+14.0	M04	Plastic SMD
NE3509M14	0.6	400	1 to 6	2	2.0	10	0.4	18.5	2.0	10	+11.0	M14	Plastic SMD
NE3510M04	0.6	280	1 to 6	2	2.0	10	0.35	19.0	3.0	30	+12.0	M04	Plastic SMD
NE3511S02	0.2	160	4 to 18	12	2.0	10	0.30	13.5	—	—	—	S02	Micro-X Plastic
NE3512S02	0.2	160	4 to 18	12	2.0	10	0.35	13.5	—	—	—	S02	Micro-X Plastic
NE3513M04	0.2	160	10 to 14	12	2.0	6	0.45	13.0	—	—	—	M04	Plastic SMD
NE3514S02	0.2	160	4 to 20	20	2.0	10	0.75	10.0	—	—	—	S02	Micro-X Plastic
NE3515S02	0.2	200	6 to 18	12	2.0	10	0.3	12.5	3.0	25	+14.0	S02	Micro-X Plastic
NE3516S02	0.2	160	6 to 18	12	2.0	10	0.35	14.0	—	—	—	S02	Plastic SMD
NE3520S03	—	160	10 to 26	20	2.0	10	0.65	13.5	—	—	—	S03	Micro-X Plastic
NE3521M04	—	—	10 to 26	20	2.0	10	0.85	11	—	—	—	M04	Plastic SMD

GaAs RFIC Power Amplifiers Handset and Wireless Applications

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)				Package Style	Description	Application
	Frequency Range (MHz)	Test Conditions	Output Power (dBm)	Power Added Efficiency (%)			
UPG2118K	410 to 2500	f = 915 MHz P_{IN} = 0 dBm V_D = 3.2 V	+31.5 TYP	50 TYP	K	3 stage E-Mode Power Amplifier IC	AMR, ISM

Push-Pull CATV Hybrid Amplifiers (V_{DD} = 24 V, Z_S = Z_L = 75 Ω)

Part Number	Frequency (MHz, min – max)	Gain (dB, min – max)	CTB[1] (dBc, max)	CSO[1] (dBc, max)	X-MOD[1,2] (dBc, max)	NF[3] (dB, max)	I_{DD} (mA, max)
MC-7831	50 – 870	18.0 – 19.0	-57	-57	-50	7.0	240
MC-7831-HA	40 – 1000	18.0 – 19.0	-57	-57	-50	7.0	240
MC-7832	50 – 870	22.0 – 23.0	-57	-57	-50	6.5	240
MC-7832-HA	40 – 1000	22.0 – 23.0	-57	-57	-50	6.5	240
MC-7833	50 – 870	25.0 – 26.0	-57	-57	-50	6.0	240
MC-7836	50 – 870	27.0 – 28.0	-58	-58	-52	6.0	260

Notes:
1. Distortion measurements at V_{OUT} = 44 dBm V flat, 110 channels.
2. Measured using EIAJ methods and procedures.
3. Noise Figure measured at 870 MHz.

Power Doubler CATV Hybrid Amplifiers (V_{DD} = 24 V, Z_S = Z_L = 75 Ω)

Part Number	Freqency (MHz, min – max)	Gain (dB, min – max)	CTB (dBc, typ)	CTB (dBc,max)	CSO (dBc, typ)	X-MOD[1] (dBc, typ)	X-MOD[1] (dBc, max)	I_{DD} (mA, max)
MC-7881[2]	50 – 870	18.0 – 19.0	–	-60	–	–	-63	360
MC-7882[2]	50 – 870	20.0 – 21.0	–	-60	–	–	-63	360
MC-7883[2]	50 – 870	22.0 – 23.0	–	-60	–	–	-63	360
MC-7884[2]	50 – 870	25.0 – 26.0	–	-60	–	–	-63	360
MC-7891[3]	40 – 1000	18.0 – 19.5	–	-63	–	–	-65	385
MC-7893[3]	40 – 1000	22.5 – 24.0	–	-63	–	–	-65	385
MC-7894[3]	40 – 1000	24.5 – 25.5	–	-63	–	–	-65	385
MC-7896[3]	40 – 1000	27.0 – 28.0	–	-63	–	–	-65	385

Notes:
1. Measured using EIAJ methods and procedures.
2. Distortion measurements are made with 110 channels loading, V_{OUT} = +52 dBmV at 745.25 MHz, 10 dB tilted across the band.
3. Distortion measurements are made with 77 channels loading, V_{OUT} = +52 dBmV at 547.25 MHz, 7 dB tilted across the band.

Silicon LD-MOSFET Power Devices

Silicon LD-MOSFETs Typical Specifications @ Tc = 25°C

Part Number	P_{OUT} (dBm) TYP	Linear Gain (dB) TYP	Test Conditions				Package Description
			Freq (GHz)	P_{IN} (dBm)	V_{DS} (V)	I_{DSQ} (mA)	
NE552R479A	+26.0	11	2.45	+19	3.0	200	79A Pkg: Compact SMT
NE5511279A	+40.0	15.0	0.9	+27	7.5	400	79A Pkg: Compact SMT
NE5520279A	+32.0	10	1.8	+25	3.2	700	79A Pkg: Compact SMT
NE5520379A	+35.5	16	0.9	+25	3.2	600	79A Pkg: Compact SMT
NE5531079A	+40.0	20.5	0.46	+25	7.5	200	79A Pkg: Compact SMT
NE55410GR	+40.4	25	2.1	+16	28	120	GR Pkg: 16 pin plastic HTSSOP
NE5500234	+32.5	11	1.9	+25	4.8	400	34 Pkg: Compact SMT
NE5500434	+35.0	14	0.9	+25	4.8	600	34 Pkg: Compact SMT
NE5550234	+33	23.5	0.46	+15	7.5	40	34 Pkg: Compact SMT
NE5550279A	+33	22.5	0.46	+15	7.5	40	79A Pkg: Compact SMT
NE5550779A	+38.5	22	0.46	+25	7.5	140	79A Pkg: Compact SMT
NE5550979A	+38.6	16	0.90	+27	7.5	200	79A Pkg: Compact SMT

Silicon Bipolar Transistors

Small Signal Silicon Devices

Part Number	TEST f (GHz)	NF/G_A		NF TYP (dB)	G_A TYP (dB)	MAG/MSG			f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Package Description
		V_{CE} (V)	I_{CQ} (mA)			V_{CE} (V)	I_C (mA)	TYP (dB)				
NE202930	1.0	5	5	1.15	13.5	5	30	15.5	11	140	100	30 Pkg: 3 pin Super Mini Mold, SOT-323 style
NE662M04	2.0	2	5	1.1	16	2	20	20	23	70	35	M04 Pkg: 4 pin low profile SOT-343 style
NE662M16	2.0	2	5 / 20	1.1	17	2	20	19	25	70	35	M16 Pkg: 6 pin low profile, recessed leads
NE66219	2.0	2	5	1.5	12.0	2	20	14	21	80	35	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NE68018	2.0	6	5	1.8	10.0	1	1	12.5	10	100	35	18 Pkg: 4 pin Super Mini Mold
NE68019	2.0	3	5	1.9	9.0	1	1	12.0	8	120	35	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NE68030	2.0	6	5	1.7	9.5	6	10	8.5	10	100	35	30 Pkg: 3 pin Super Mini Mold, SOT-323 style
NE68033	2.0	6	5	1.8	9.0	6	10	8.0	10	100	35	33 Pkg: 3 pin Mini Mold, SOT-23 style
NE68039	2.0	6	5	1.7	11.0	6	10	9.0	10	100	35	39 Pkg: 4 pin Mini Mold
NE68118	1.0	2.5	3	1.1	13.0	2.5	3	16.0	9	100	65	18 Pkg: 4 pin Super Mini Mold
NE68119	1.0	2.5	3	1.1	12.0	2.5	3	15.5	7	120	65	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NE68130	1.0	8	7	1.5	13.5	8	20	13.0	7	120	65	30 Pkg: 3 pin Super Mini Mold, SOT-323 style
NE68133	1.0	8	7	1.2	13.0	8	20	11.0	9	100	65	33 Pkg: 3 pin Mini Mold, SOT-23 style
NE68139	1.0	8	7	1.2	13.5	8	20	15.0	9	100	65	39 Pkg: 4 pin Mini Mold, SOT-143 style
NE68518	2.0	2.5	3	1.5	8.5	2.5	3	12.0	12	110	30	18 Pkg: 4 pin Super Mini Mold
NE68519	2.0	2.5	3	1.5	7.5	2.5	3	11.0	12	110	30	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NE85618	1.0	2.5	3	1.4	11.0	2.5	3	14.0	6.5	120	100	18 Pkg: 4 pin Super Mini Mold
NE85619	1.0	2.5	3	1.5	10.0	2.5	3	13.5	4.5	120	100	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NE85630	1.0	10	7	1.3	12.0	10	20	12.0	4.5	110	100	30 Pkg: 3 pin Super Mini Mold, SOT-323 style
NE85633	1.0	10	7	1.4	9.0	10	20	11.5	7	120	100	33 Pkg: 3 pin Mini Mold, SOT-23 style
NE85639	1.0	10	7	1.5	13.5	10	20	13.0	7	120	100	39 Pkg: 4 pin Mini Mold, SOT-143 style
NE97733	1.0	−8	−3	1.5	10.0	−8	−20	12.0	8.5	60	−50	33 Pkg: 3 pin Mini Mold, SOT-23 style (PNP)
NE97833	1.0	−10	−3	2.0	7.0	−10	−15	10.0	5.5	40	−50	33 Pkg: 3 pin Mini Mold, SOT-23 style (PNP)

Small Signal SiGe Devices

Part Number	TEST f (GHz)	NF/G_A		NF TYP (dB)	G_A TYP (dB)	MAG/MSG			f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Package Description
		V_{CE} (V)	I_{CQ} (mA)			V_{CE} (V)	I_C (mA)	TYP (dB)				
NESG2021M05	2	2	3	0.9	18.0	3	10	22.5	25	195	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG2021M05	5.2	2	3	1.3	10.0	—	—	—	—	195	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG2021M16	2	2	3	0.9	18	3	10	22.5	25	190	35	M16 Pkg: 6 pin low profile, recessed leads
NESG2031M05	2	2	5	0.8	17.0	3	20	21.5	—	195	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG2031M05	5.2	2	5	1.3	10.0	—	—	—	—	195	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG210719	2	1	5	0.9	9.0	—	—	—	10	180	100	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style
NESG3031M05	5.2	2	6	0.95	10.0	—	—	—	—	300	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG3031M05	5.8	2	6	1.1	9.5	3	20	14.0	—	300	35	M05 Pkg: 4 pin low profile SOT-343 style
NESG3031M14	5.2	2	6	0.95	10.0	—	—	—	—	300	35	M14 Pkg: 4 pin low profile, recessed leads
NESG3031M14	5.8	2	6	1.1	9.5	3	20	15.0	—	300	35	M14 Pkg: 4 pin low profile, recessed leads
NESG3032M14	2.0	2	6	0.6	17.5	3	20	20.5	—	300	35	M14 Pkg: 4 pin low profile, recessed leads
NESG3033M14	2.0	2	6	0.6	17.5	3	20	20.5	—	300	35	M14 Pkg: 4 pin low profile, recessed leads
NESG7030M04	5.8	2	5	0.75	14	2	15	17.5	—	320	30	M04 Pkg: 4 pin low profile SOT-343 style

Medium Power Transistors

Part Number	TEST f (GHz)	P_{1dB}			MAG / MSG			f_T TYP (GHz)	h_{FE} TYP	IC MAX (mA)	Package Description
		V_{CE} (V)	I_{CQ} (mA)	TYP (dBm)	V_{CE} (V)	I_C (mA)	TYP (dB)				
NE46134	1.0	12.5	100	27.5	10	50	9	5.5	100	250	34 Pkg: 4 pin SOT-89 style
NE461M02	1.0	12.5	100	27.5	10	50	11	5.5	120	250	M02 Pkg: 4 pin high gain SOT-89 style
NE663M04	2.0	2	50	16	2	50	15	18	100	100	M04 Pkg: 4 pin low profile SOT-343 style
NE664M04	1.8	3.6	200	26	3	100	12	20	60	500	M04 Pkg: 4 pin low profile SOT-343 style
NE677M04	1.8	2.8	23	15	3	20	16	15	120	50	M04 Pkg: 4 pin low profile SOT-343 style
NE678M04	1.8	2.8	40	18	3	30	13.5	12	120	100	M04 Pkg: 4 pin low profile SOT-343 style
NE85634	1.0	10	40	22	10	40	11	6.5	120	100	34 Pkg: 4 pin SOT-89 style
NE856M02	1.0	10	40	22	10	50	14	6.5	120	100	M02 Pkg: 4 pin high gain SOT-89 style
NESG2101M05[1]	2.0	3.6	10	21	3	50	17	17.0	195	100	M05 Pkg: 4 pin low profile SOT-343 style
NESG250134[1]	0.5	3.6	3.6	29	3.6	100	23	10	120	500	34 Pkg: 4 pin SOT-89 style
NESG250134[1]	0.9	3.6	3.6	29	–	–	–	10	120	500	34 Pkg: 4 pin SOT-89 style
NESG260234[1]	0.46	6.0	6.0	30	6	100	23	15	120	600	34 Pkg: 4 pin SOT-89 style
NESG260234[1]	0.9	6.0	6.0	30	–	–	–	10	120	600	34 Pkg: 4 pin SOT-89 style
NESG270034[1]	0.46	6.0	6.0	33.5	–	–	–	15	120	750	34 Pkg: 4 pin SOT-89 style
NESG270034[1]	0.9	6.0	6.0	31.5	–	–	–	15	120	750	34 Pkg: 4 pin SOT-89 style
UPA901TU	5.8	3.6	3.6	19	3.6	52	25	–	120	300	TU Pkg: 8 pin Mini Mold

Note: **1.** SiGe part

Silicon Bipolar Transistors *continued*

Twin Transistors

Part Number	TEST f (GHz)	NF/G_A V_{CE} (V)	NF/G_A I_C (mA)	NF TYP (dB)	G_A TYP (dB)	MAG (dB)	$\|S_{21E}\|^2$ V_{CE} (V)	$\|S_{21E}\|^2$ I_C (mA)	$\|S_{21E}\|^2$ TYP (dB)	f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Pkg. Code	Package Style	Die
UPA800T	2.0	3	5	1.9	9.0	12.0	3	5	7.5	8	120	35	S06	SOT-363	NE680
UPA801T	1.0	3	7	1.2	10.0	14.0	3	7	9.0	4.5	120	100	S06	SOT-363	NE856
UPA802T	1.0	3	7	1.4	14.0	16.0	3	7	12.0	7.0	100	65	S06	SOT-363	NE681
UPA806T	2.0	3	3	1.5	7.5	11.0	3	10	8.5	12.0	110	30	S06	SOT-363	NE685
UPA810T	1.0	3	7	1.2	10.0	14.0	3	7	9.0	4.5	120	100	S06	SOT-363	NE856
UPA811T	2.0	3	5	1.9	9.0	12.0	3	5	7.5	8	120	35	S06	SOT-363	NE680
UPA812T	1.0	3	7	1.4	14.0	16.0	3	7	12.0	7.0	100	65	S06	SOT-363	NE681

Silicon Transistor Chips

Part Number	TEST f (GHz)	NF/G_A V_{CE} (V)	NF/G_A I_C (mA)	NF TYP (dB)	G_A TYP (dB)	MAG TYP (dB)	$\|S_{21E}\|^2$ V_{CE} (V)	$\|S_{21E}\|^2$ I_C (mA)	$\|S_{21E}\|^2$ TYP (dB)	f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Pkg. Code	Die
NE66200	2.0	2	5	1.1	16.0	19.0	2	20	17	25	70	35	00	NE662
NE66300	2.0	2	10	1.2	17.5	14.0	2	50	11	25	70	100	00	NE663
NE68000	4.0	6	5	2.6	8.0	12.5	6	10	9.0	10.0	100	35	00	NE680
NE68100	2.0	8	7	1.6	12.0	19	8	20	14.0	9.0	100	65	00	NE681
NE85600	2.0	10	7	2.1	10.0	16	10	20	9.0	7.0	120	100	00	NE856
NESG303100G	2.4 / 5.8	2	6	0.6 / 1.1	16.0 / 9.5	14	3	20	8.5	110	300	35	00	NESG3031

Oscillator Transistors

Part Number	P_{OSC} f (GHz)	P_{OSC} V_{CE} (V)	P_{OSC} I_C (mA)	P_{OSC} TYP (W)	f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Pkg. Code	Package Description
NE58219	0.9	5.0	5.0	0.001	5.0	90	60	19	19 Pkg: 3 pin Ultra-Super Mini Mold, SC-90 style

Switching Transistors

Part Number	C_{CB} V_{CB} (V)	C_{CB} TYP (pF)	f_T TYP (GHz)	Typical Switching Times V_{CE} (V)	I_C (mA)	$T_{d\ (ON)}$ (ns)	T_r (ns)	$T_{d\ (OFF)}$ (ns)	T_f (ns)	$\|S_{21e}\|^2$ f (GHz)	V_{CE} (V)	I_C (mA)	TYP (dB)	h_{FE} TYP	I_C MAX (mA)	Pkg. Code	Package Description
NE68100	10	0.2	9.0	8	15	0.3	–	0.2	–	2.0	8	20	11.0	100	65	00	Chip
NE68118	10	0.25	9.0	8	15	0.4	–	0.3	–	1.0	8	20	15.0	100	65	18	18 Pkg: 4 pin Super Mini Mold
NE68119	3	0.45	7.0	8	15	0.6	–	0.5	–	1.0	3	7	12.0	100	65	19	19 Pkg: 3 pin SC-90 style
NE68133	10	0.35	9.0	8	15	0.4	–	0.3	–	1.0	8	20	13.0	100	65	33	33 Pkg: 3 pin SOT-23 style

Low Power Amplifiers

Part Number	Typical Frequency Range @ 3dB down (MHz)	ELECTRICAL CHARACTERISTICS[1] (T_A = 25°C)												Package Code	Package Style
		V_{CC} (V)	I_{CC} (mA)			NF (dB)	Gain (dB)			RL_{IN} (dB)	RL_{OUT} (dB)	P_{1dB} (dBm)	ISOL (dB)		
			MIN	TYP	MAX	TYP	MIN	TYP	MAX	TYP	TYP	TYP	TYP		
UPC2745TB[2]	2700	3	5	7.5	10	6.0	9	12	14	11	5.5	-3.0	38	S06 / TB	SOT-363
UPC2746TB[2]	1500	3	5	7.5	10	4.0	16	19	21	13	8.5	-3.7	45	S06 / TB	SOT-363
UPC2748TB[3]	1500	3	4.5	6	8	2.8	16	19	21	11.5	8.5	-8.5	40	S06 / TB	SOT-363
UPC2749TB[4]	2900	3	4	6	8	4	13	16	18.5	10	13	-12.5	30	S06 / TB	SOT-363
UPC3237TK[2]	1000	3	3.5	5.0	7	1.4	13.0	15.3	17.5	10	14	-5.5	22	TK	6 pin Recessed Lead
UPC8178TK	2700	3	1.4	1.9	2.4	5.5	9.0	11.0	13.5	8	—	-8.0	41	TK	6 pin Recessed Lead
UPC8179TK[4]	Note 5	3	2.9	4.0	5.4	5.0	13.0	15.5	17.5	7	—	0.5	42	TK	6 pin Recessed Lead

Notes: **1.** ZL = 50 Ω for all Electrical Characteristics **2.** f = 500 MHz test condition **3.** f = 900 MHz test condition **4.** f = 1900 MHz test condition
5. 100 – 2400 MHz with output port matching

Wideband Amplifiers

Part Number	Typical Frequency Range @ 3dB down (MHz)	ELECTRICAL CHARACTERISTICS[1] (T_A = 25°C)												Package Code	Package Style
		V_{CC} (V)	I_{CC} (mA)			NF (dB)	Gain (dB)			RL_{IN} (dB)	RL_{OUT} (dB)	P_{1dB} (dBm)	ISOL (dB)		
			MIN	TYP	MAX	TYP	MIN	TYP	MAX	TYP	TYP	TYP	TYP		
UPC2708TB[3]	2900	5	20	26	33	6.5	13	15	18.5	11	20	+9.2	23	S06 / TB	SOT-363
UPC2709TB[3]	2300	5	19	25	32	5.0	21	23	26.5	10	10	+8.7	31	S06 / TB	SOT-363
UPC2710TB[2]	1000	5	16	22	29	3.5	30	33	36.5	6	12	+10.8	39	S06 / TB	SOT-363
UPC2712TB[3]	2600	5	9	12	15	4.5	18	20	23.5	12	13	-0.4	33	S06 / TB	SOT-363
UPC2762TB[4]	2900	3	—	27	35	7.0	11.5	15.5	17.5	8.5	12	+7	25	S06 / TB	SOT-363
UPC3223TB[3]	3200	5	15	19	24	4.5	20.5	23	22.5	12	12	+6.5	33	S06 / TB	SOT-363
UPC3224TB[3]	3200	5	7.0	9.0	12.0	4.3	19	21.5	24	12	17	-3.5	40	S06 / TB	SOT-363
UPC3227TB[3]	3200	5	4.0	4.8	6.0	4.7	20.5	22.5	24.5	10.5	13.5	-6.5	40	S06 / TB	SOT-363
UPC3232TB[3]	3200	5	20	26	32	4.0	30	32.8	35.5	9.5/13	10/14.5	+11	41	S06 / TB	SOT-363
UPC3236TK[3]	3000	5	19	24	31	2.6	36	38	41	9	11	+10	50	TK	6-pin Recessed Lead
UPC3239TB[3]	3000	3.3	23	29	37	4.2	22	25	28	15	25	+9	35	S06 / TB	SOT-363
UPC3242TB[3]	3000	3.3	—	4.3	—	3.5	—	22	—	10	10	+10.5	—	S06 / TB	SOT-363
UPC3244TB	2900	3.3	14.5	18	22	3.1	26.5	29.5	32.5	12	12	+7.0	40	S06 / TB	SOT-363
UPC8181TB[4]	4000	3	—	23	30	4.5	18	21	24	10.5	10	+7	32	S06 / TB	SOT-363
UPC8182TB[4]	2900	3	22	30	38	4.5	17.5	20.5	23.5	0	11	+9.0	32	S06 / TB	SOT-363

Notes: **1.** ZL = 50 Ω for all Electrical Characteristics **2.** f = 500 MHz test condition **3.** f = 1000 MHz test condition **4.** f = 1900 MHz test condition

SiGe and SiGe:C Low Noise Amplifiers

Part Number	Typical Frequency (GHz)	ELECTRICAL CHARACTERISTICS (T_A = 25°C)												Package Code	Package Style
		V_{CC} (V)	I_{CC} (mA)			NF (dB)	Gain (dB)			RL_{IN} (dB)	RL_{OUT} (dB)	P_{1dB} (dBm)	ISOL (dB)		
			MIN	TYP	MAX	TYP	MIN	TYP	MAX	TYP	TYP	TYP	TYP		
UPC8211TK	1.575	3	—	3.5	4.5	1.3	15.5	18.5	21.5	-7.5	14.5	-24	32	TK	6 pin Recessed Lead
UPC8231TK	1.575[1]	3	—	3.5	–	0.80	—	20.0	—	-13	-14	-22	—	TK	6 pin Recessed Lead
UPC8233TK	1.575[1]	1.8	—	3.5	–	0.95	—	20.0	—	-16	-16	-23	36	TK	6 pin Recessed Lead
UPC8236T6N	1.575	1.8	—	6.5	–	0.8	—	19.5	—	-11	-14	-18	39	T6N	6 pin Leadless
UPC8240T6N	1.575	3	4.5	6.5	9.0	1.0	24.5	28	31	8.5	17	-22.5	55	T6N	6 pin Leadless

Notes: **1.** Tunable over 0.8 to 3.0GHz

SiGe BiCMOS Wideband LNA with Bypass

Part Number	Mode	ELECTRICAL CHARACTERISTICS (T_A = 25°C)											Package Code	Package Style
		Typical Frequency @ 3 dB Down (MHz)	V_{CC} (V)	I_{CC} (mA)	NF (dB)	Gain (dB)			RL_{IN} (dB)	RL_{OUT} (dB)	Input P_{1dB} (dB)	Input IP_3 (dB)		
				TYP	TYP	MIN	TYP	MAX	TYP	TYP	TYP	TYP		
UPD5740T6N	LNA	770	2.8	5.0	1.5	11.5	13.5	15.5	10	11	-5.0	+2	T6N	8 pin SSOP
	Bypass	770		1µA	—	-2.0	-1.3	—	17.0	17.0	+8	+30		
UPD5750T7D	LNA	770	1.8	3.1	1.4	—	12.5	—	—	8	-11	-8	T7D	WL-BGA
	Bypass	770		1µA	—	—	-1.4	—	14	14	+8	+32		
UPD5756T6N	LNA	1000	3.3	25	3.2	10.5	13	15.5	10	12	+10	+9	T6N	8 pin SSOP
	Bypass	1000		1µA	—	—	—	—	—	—	—	+29		

AGC Amplifiers with Video Output

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)												Package Code	Package Style
	Typical Frequency @ 3 dB Down (MHz)	V_{CC} (V)	I_{CC} (mA)			NF (dB)	Gain (dB)		RL_{IN} (dB)	RL_{OUT} (dB)	V_{OUT}[2] (p–p)	AGC (dB)		
			MIN	TYP	MAX	TYP	MIN	MAX	TYP	TYP	TYP	TYP		
UPC3218GV[1]	100	5	15	23	34	3.5	10	63	N/A	N/A	1.0	53	S08 / GV	8 pin SSOP
UPC3221GV[1]	100	5	26	33	41	4.2	10	60	N/A	N/A	1.0	50	S08 / GV	8 pin SSOP
UPC3231GV[1]	90	5	28	36	44	5.0	4	65	N/A	N/A	1.0	61	S08 / GV	8 pin SSOP

Notes: **1.** f_{IN} = 45 MHz, Z_S = 50Ω, Z_L = 250Ω, single-ended output

Variable Gain Amplifiers

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)										Package Code	Package Style
	Typical Frequency @ 3 dB Down (MHz)	V_{CC} (V)	I_{CC} (mA)			NF (dB)	Gain (dB)		RL_{IN} (dB)	RL_{OUT} (dB)		
			MIN	TYP	MAX	TYP	MIN	MAX	TYP	TYP		
UPC3245TB	250-3000	3.3	—	27.5	—	4.0 to 9.0	6.5	25	15	15	TB	SOT-363

Frequency Upconverters

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)								Package Code	Package Style
	IF Input Frequency Range @3 dB Down (MHz)	RF Output Frequency Range (MHz)	V_{CC} (V)	I_{CC} (mA)	Conversion Gain (dB)	P_{SAT}[1] (dBm)	Noise Figure (dB)	OIP_3		
	TYP	TYP		TYP	TYP	TYP	TYP			
UPC8106TB[2]	50-400	400-2000	3.0	9.0	10.0	-2.0	8.5	+5.5	S06 /TB	SOT-363
UPC8172TB[3]	50-400	800-2500	3.0	9.0	8.5	0.0	10.4	+6.0	S06 /TB	SOT-363
UPC8187TB[4]	50-400	800-2500	3.0	15	11	+2.5	12	+10.0	S06 /TB	SOT-363

Notes: **1.** PIN = 0 dBm **2.** RF = 900 MHz, LO = 660 MHz, PLO = -5 dBm **3.** RF = 1900 MHz, LO = 1660 MHz, P_{LOIN} = -5 dBm
4. RF = 1900 MHz, LO = 1780 MHz, P_{LO} = -5 dBm

Frequency Downconverters

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)								Package Code	Package Style
	RF Input Frequency Range @3 dB Down (MHz)	IF Output Frequency Range @3 dB Down (MHz)	V_{CC} (V)	I_{CC} (mA)	Conversion Gain (dB)	P_{SAT} (dBm)	Noise Figure (dB)	Test Condition (Note)		
	TYP	TYP		TYP	TYP	TYP	TYP			
UPC2756TB	100-2000	10-300	3.0	5.9	14	-12	13	3	S06 / TB	SOT-363
UPC2757TB[1]	100-2000	20-300	3.0	5.6	13	-8	13	4	S06 / TB	SOT-363
UPC2758TB[1]	100-2000	20-300	3.0	11	17	-4	13	4	S06 / TB	SOT-363
UPC8112TB[1]	800-2000	100-300	3.0	8.5	13	-3	11.2	5	S06 / TB	SOT-363

Note: **1.** AGC Amp and Mixer Block only

Out-of-Band Tuners Downconverter with AGC & Video Amplifiers for CATV/Settop Box

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)							Package Code	Package Style
	RF Input Frequency Range (MHz)	V_{CC} (V)	I_{CC} (mA)	Conversion Gain (dB)	Gain Control Range (dB)	Noise Figure (dB)	IM3 (dBc) Code		
			TYP	TYP	TYP	TYP			
UPC3220GR	30 – 250	5.0	42	33	46	7.0	55	GR / S16	16 pin SSOP
UPC3243T7A	50 – 300	3.3	85	78	60	7.6	59	T7A	28 pin QFN

Prescalers (Frequency Dividers)

Part Number	ELECTRICAL CHARACTERISTICS (T_A = 25°C)							Divide Ratio	Package Code	Package Style
	f_{IN} (GHz)		P_{IN} (dBm)		V_{CC} (V)	I_{CC} (mA)				
	MIN	MAX	MIN	MAX		MIN	MAX			
UPB1507GV	0.5	3.0	-15	+6	5.0	12.5	26.5	64/128/256	S08 / GV	8 pin SSOP
UPB1509GV	0.05	1.0	-20	-5	2.2 to 5.5	3.5	5.9	2/4/8	S08 / GV	8 pin SSOP

CEL /JEITA[1] Cross Reference List

CEL Part Number	JEITA[1] Part Number
NE46134	2SC4536
NE461M02	2SC5337
NE46234	2SC4703
NE58219	2SC5004
NE66219	2SC5606
NE662M04	2SC5508
NE662M16	2SC5704
NE663M04	2SC5509
NE664M04	2SC5754
NE677M04	2SC5751
NE678M04	2SC5753
NE68018	2SC5013
NE68019	2SC5008
NE68030	2SC4228
NE68033	2SC3585

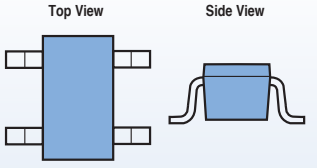
CEL Part Number	JEITA[1] Part Number
NE680M03	2SC5434
NE68118	2SC5012
NE68119	2SC5007
NE68130	2SC4227
NE68133	2SC3583
NE68518	2SC5015
NE68519	2SC5010
NE85618	2SC5011
NE85619	2SC5006
NE85630	2SC4226
NE85633	2SC3356
NE85634	2SC3357
NE856M02	2SC5336
NE97733	2SA1977
NE97833	2SA1978

Notes: **1.** JEITA = Japan Electronics and Information Technology Industries Association

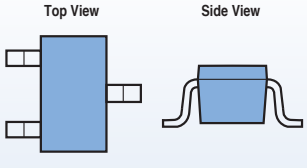
Package Dimensions Units in mm

These dimensions are for the package only. For detailed dimensions including leads, please refer to the datasheet.

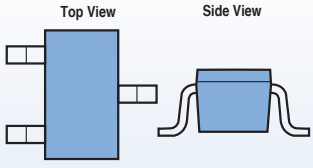
18 Package (1.25 x 2.0 x 0.9)



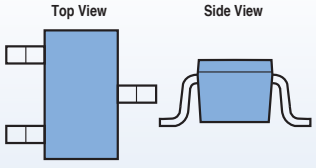
19 Package (0.8 x 1.6 x 0.75)



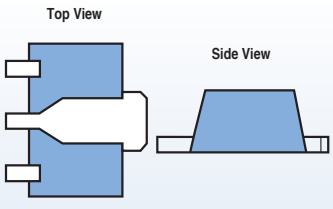
30 Package (1.25 x 2.0 x 0.9)



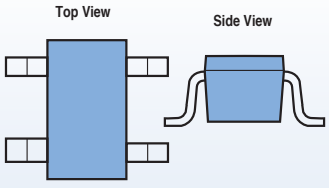
33 Package (1.5 x 2.9 x 1.4)



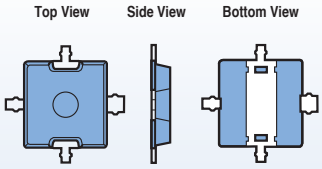
34 Package (2.5 x 4.5 x 1.5)



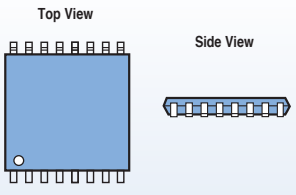
39 Package (1.5 x 2.9 x 1.1)



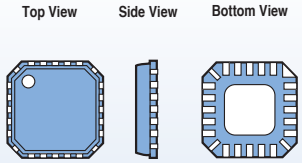
79A Package (4.2 x 4.4 x 0.9)



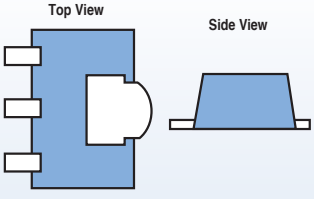
GR / S16 SSOP Package (5.5 x 4.4 x 1.44)



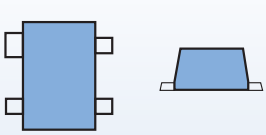
K Package / 20 Pin MLP (4.15 x 4.15 x 0.9)



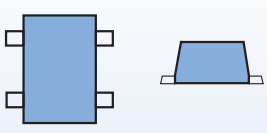
M02 Package (2.45 x 4.5 x 1.5)



M04 Package (1.25 x 2.0 x 0.6)



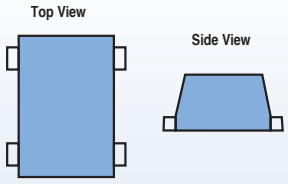
M05 Package (1.25 x 2.0 x 0.6)



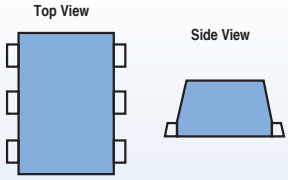
Package Dimensions *continued* Units in mm

These dimensions are for the package only. For detailed dimensions including leads, please refer to the datasheet.

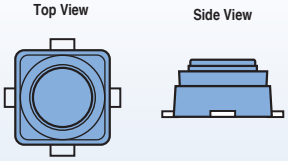
M14 Package (0.8 x 1.2 x 0.5)



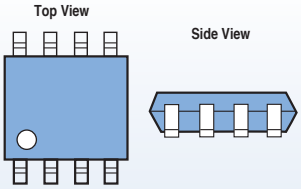
M16 Package (0.8 x 1.2 x 0.5)



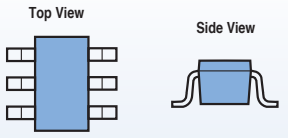
S02 / S03 Package (2.6 x 2.6 x 1.5)



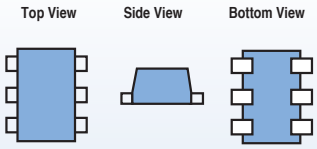
S08 / GV Package (3.0 x 3.2 x 1.5)



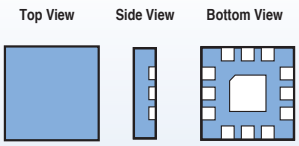
T / TB / S06 Package (1.25 x 2.0 x 0.9)



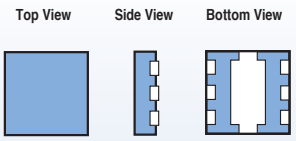
TK Package (1.1 x 1.5 x 0.55)



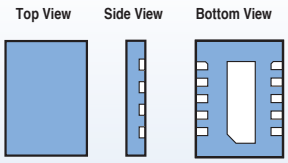
T5L / T6M Package (2.0 x 2.0 x 0.37)



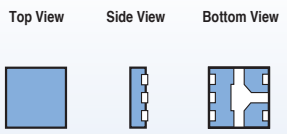
T5N / T6N Package (1.5 x 1.5 x 0.37)



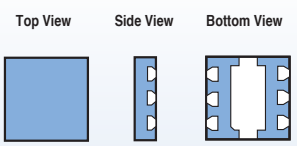
T6Q / TSSON 10 Package (1.35 x 2.0 x 0.37)



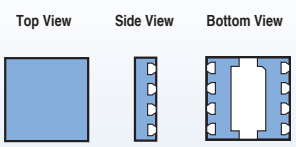
T6R Package (1.0 x 1.0 x 0.37)



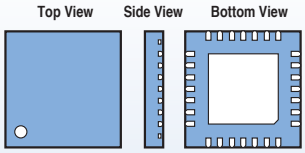
T6X / TSON 6 Package (1.5 x 1.5 x 0.37)



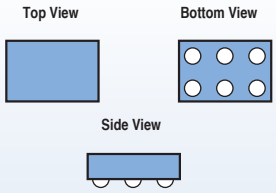
T6Z / TSON 8 Package (1.5 x 1.5 x 0.37)



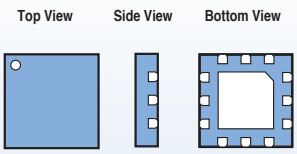
T7A / QFN 28 Package (5.0 x 5.0 x 0.72)



T7D / WLBGA 6 Package (0.73 x 0.48 x 0.07)



T7K Package (2.0 x 2.0 x 0.57)



Notes

Notes

Notes

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