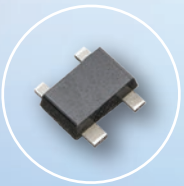
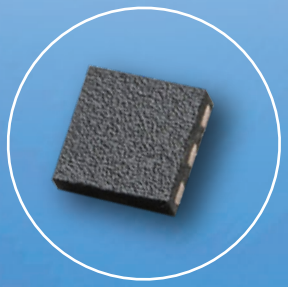
A Business Partner of Renesas Electronics Corporation.

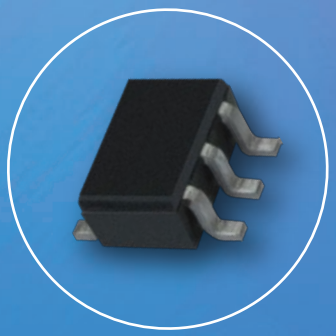
CEL California Eastern Laboratories

2014

RF & Wireless Semiconductors







RENESAS

About CEL

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. These 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 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.

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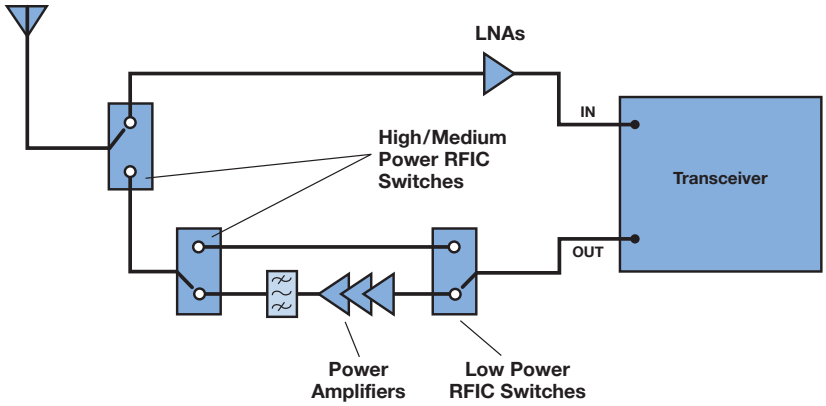
PRODUCTS by APPLICATION

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

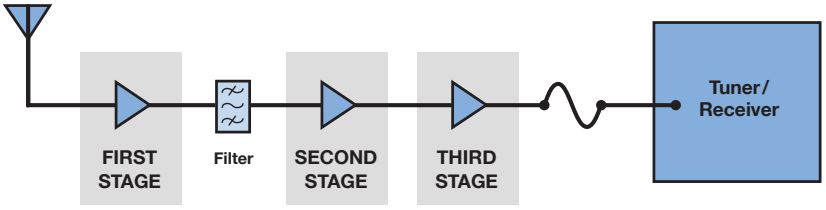
Wi-Fi • Bluetooth • ZigBee • Automated Meter Reading • Mesh & Home Area Networks • ISM Band applications



RFIC Switches (additional P/Ns available, see page 5)		450 MHz	915 MHz	2.4 GHz
UPG2409TB / T6X	SPDT, High power, SOT-363 and TSON/QFN package options	✔	✔	✔
UPG2176T5N	SPDT, High power, internally terminated (absorptive)	✔	✔	✔
UPG2415TK / T6X	SPDT, High power, miniature and TSON/QFN package options	✔	✔	✔
UPG2408TB / TK	SPDT, Medium power, SOT-363 and more compact package options	✔	✔	✔
UPG2406TK	SPDT, Medium power, compact package (opposite logic vs. UPG2408TX)	✔	✔	✔
UPG2214TB / TK	SPDT, Low power, High Isolation, SOT-363 and compact package options	✔	✔	✔
UPD5713TK	SPDT, Single Control, ideal for low frequency applications	✔	✔	
UPG2164T5N	DPDT, Diversity/Transfer Switch (two selectable RF paths on)	✔	✔	✔
Power Amplifier Transistors (additional P/Ns available, see page 6)		450 MHz	915 MHz	2.4 GHz
NE5550979A	+39.5dBm, 9W, 7.5V LD MOSFET	✔	✔	
NE5550234	+33dBm, 2W, 7.5V LDMOS FET	✔	✔	
NE664M04	+26dBm, 3.6V Silicon Discrete	✔	✔	✔
NE678M04	+18dBm, 3.0 V Silicon Discrete	✔	✔	✔
NE677M04	+15dBm, 3.0 V Silicon Discrete	✔	✔	✔
Low Noise Amplifier Transistors		450 MHz	915 MHz	2.4 GHz
NE662M04	Silicon Discrete, NF = 1.1, Ga = 16.0, OIP3 = +22dBm @ 2GHz	✔	✔	✔
NE3509M04	GaAs FET, NF = 0.40, Ga = 17.5, OIP3 = +22dBm @ 2 GHz		✔	✔
NE3508M04	GaAs FET, NF = 0.45, Ga = 14.0, OIP3 = +31dBm @ 2 GHz		✔	✔

LNAs for L to C-Band Applications

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



LNAs by Application

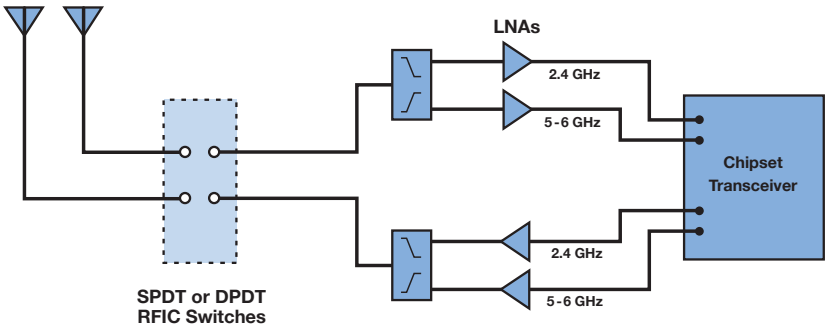
Application	Frequency	FIRST STAGE	SECOND STAGE	THIRD STAGE
Satellite Radio and DAB	1.4 – 2.35 GHz	**NE3508M04** **NE3509M04** **NE3510M04**	**NE3508M04** **NE662M04**	**NE3508M04**

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

Part Number	Description	NF (dB)	Gain (dB)	P1dB (dBm)	Package
NE3508M04	GaAs HJ-FET	0.45 @ 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
NE3510M04	GaAs HJ-FET	0.35 @ 2.0 GHz	19.0 @ 2.0 GHz	+12.0	M04
NE662M04	Silicon Transistor	1.1 @ 2.0 GHz	16.0 @ 2.0 GHz		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	
UPG2408TB	SPDT, 3V, 0.50dB Insertion Loss, High ESD immunity
UPG2406TK	SPDT, 1.8 or 2.7V control voltage, 0.45 dB Insertion Loss @ 2 GHz, High ESD immunity
GaAs RFIC Switches – Broadband to 6 GHz	
UPG2422TK	SPDT for Dual Band WLAN, very cost-effective, 1.8-5.3 V control voltage range
UPG2163T5N	SPDT, Insertion Loss: 0.4 dB @ 2.4 GHz, 0.5 dB @ 6 GHz, Isolation = 30 dB @ 6 GHz
UPG2176T5N	SPDT 2.4 – 6 GHz, Insertion Loss: 0.5 dB @ 2.4 GHz, 0.7 dB @ 5.5 GHz, internal terminations
UPG2415TK / T6X	SPDT for Dual Band WLAN, high power, low insertion loss for Access Point applications
UPG2409T6X	SPDT for Dual Band WLAN, high power, low insertion loss for Access Point applications
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, 17 dB Isolation @ 6 GHz
UPG2162T5N	DPDT, Insertion Loss: 0.6 dB @ 2.4 GHz, 0.85 dB @ 5.5 GHz, 27 dB Isolation @ 6 GHz
LNAs	
NE3509M04	GaAs HJ FET, super low 0.40 dB noise figure, 17 dB gain @ 2.5 GHz, OIP3 = +22 dBm
NE3508M04	GaAs HJ FET, super low 0.45 dB noise figure, 14 dB gain @ 2.5 GHz, OIP3 = +31 dBm

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
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
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
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
UPG2408TB	3.0	+3.0/0	0.48 @ 2 GHz	19 @ 2 GHz	+29	–	TB	Lowest cost medium power for UHF-3 GHz
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	Lowest Cost high power SPDT, 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
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	Lowest cost 6GHz SPDT, medium power, small size package, low inseriton loss, high isolation, 1.8V-5.3V

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)		
UPG2164T5N	6.0	+3.0/0	0.5 @ 2.4 GHz 0.7 @ 5.5 GHz	25 @ 2.4 GHz 17 @ 5.5 GHz	–	+31 +29	T5N	Lowest cost, lowest insertion loss DPDT. 6GHz operation.
UPG2162T5N	6.0	+3.0/0	0.6 @ 2.4 GHz 0 .85 @ 5.5GHz	30 @ 2.4 GHz 27 @ 5.5 GHz	–	+31 +29	T5N	Best isolation of all DPDTs, up to 6GHz operation
UPD5738T6N	2.5	+2.8/0	0.8 @ 1 GHz	22 @ 1 GHz	+15	+20	T6N	Only one control pin, low frequency operation, CMOS, 1.5V-3.6V

GaAs FETs

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
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

Silicon MOSFET Devices

RF Power LD-MOSFETs Typical Specifications @ T_C = 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)	
NE5550234	+33 +32.2	23.5 18.3	0.46 0.90	+15 +17	7.5 7.5	40 40	34 Pkg: Compact SMT
NE5550279A	+33	22.5	0.46	+15	7.5	40	79A Pkg: Compact SMT
NE5550779A	+38.5 +37.4	22 17	0.46 0.90	+25 +27	7.5 7.5	140 140	79A Pkg: Compact SMT
NE5550979A	+39.5 +38.6	22 16	0.46 0.90	+25 +27	7.5 7.5	200 200	79A Pkg: Compact SMT
NE5531079A	+40.0	20.5	0.46	+25	7.5	200	79A Pkg: Compact SMT

MOSFET for Microphone Impedance Conversion

Part Number	Supply Voltage (V)	Circuit Current (µA)	Input Capacitance (pF)	Voltage Gain (dB)	Output Noise Voltage (dBV)	Total Harmonic Distortion (%)	HBM ESD (KV)	M53 Package (mm)
NE5820M53	2	85	1.5	-3	-114	0.1	>8	1.0 x 1.2 x 0.33

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
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)

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

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)	$\lvert S_{21E}\rvert$			f_T TYP (GHz)	h_{FE} TYP	I_C MAX (mA)	Pkg. Code	Package Style	Die
							V_{CE} (V)	I_C (mA)	TYP (dB)						
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

3V Silicon MMIC 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
UPC2762TB[4]	2900	3	—	27	35	7.0	11.5	15.5	17.5	8.5	12	+7	25	S06 / TB	SOT-363
UPC8178TK[4]	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

5V Silicon MMIC 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
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

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

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

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

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

CEL/JEITA[1] Cross Reference List

CEL Part Number	JEITA[1] Part Number
NE46134	2SC4536
NE461M02	2SC5337
NE46234	2SC4703
NE66219	2SC5606
NE662M04	2SC5508
NE663M04	2SC5509
NE664M04	2SC5754
NE677M04	2SC5751
NE678M04	2SC5753
NE68018	2SC5013
NE68019	2SC5008
NE68030	2SC4228
NE68033	2SC3585
NE68118	2SC5012

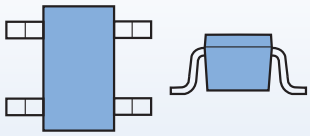
CEL Part Number	JEITA[1] Part Number
NE68119	2SC5007
NE68130	2SC4227
NE68133	2SC3583
NE68139	2SC4094
NE68518	2SC5015
NE68519	2SC5010
NE85618	2SC5011
NE85619	2SC5006
NE85630	2SC4226
NE85633	2SC3356
NE85634	2SC3357
NE856M02	2SC5336
NE97733	2SA1977
NE97833	2SA1978

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

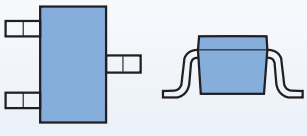
Package Dimensions Units in mm

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

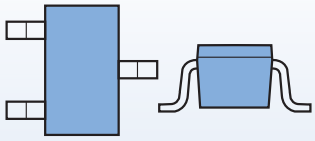
18 Package (1.25 x 2.0 x 0.9)



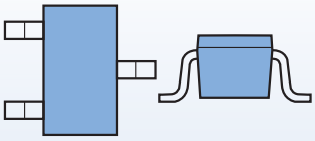
19 Package (0.8 x 1.6 x 0.75)



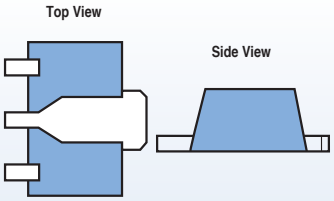
30 Package (1.25 x 2.0 x 0.9)



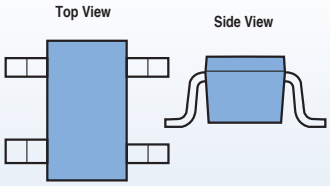
33 Package (1.5 x 2.9 x 1.4)



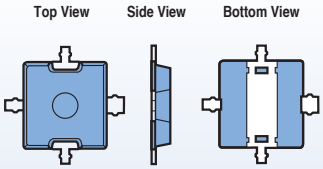
34 Package (2.5 x 4.5 x 1.5)



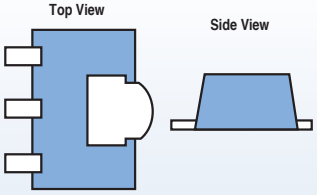
39 Package (1.5 x 2.9 x 1.1)



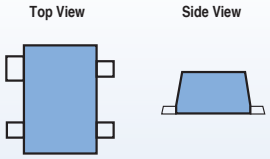
79A Package (4.2 x 4.4 x 0.9)



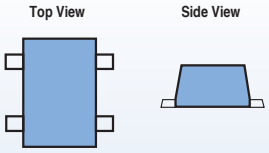
M02 Package (2.45 x 4.5 x 1.5)



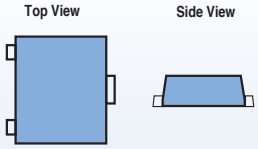
M04 Package (1.25 x 2.0 x 0.6)



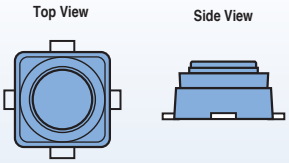
M05 Package (1.25 x 2.0 x 0.6)



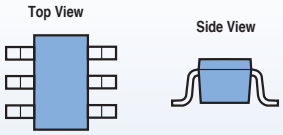
M53 Package (1.0 x 1.2 x 0.33)



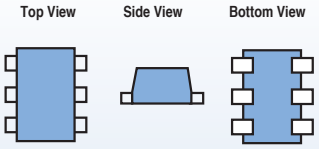
S02 / S03 Package (2.6 x 2.6 x 1.5)



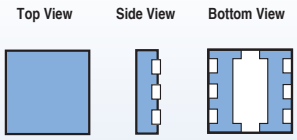
T / TB / S06 Package (1.25 x 2.0 x 0.9)



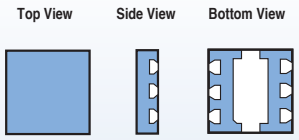
TK Package (1.1 x 1.5 x 0.55)



T5N / T6N Package (1.5 x 1.5 x 0.37)



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



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