

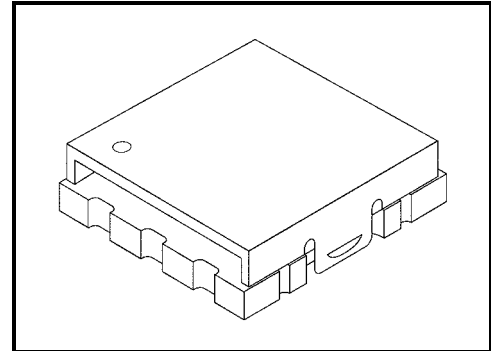
TOSHIBA RF Power Amplifier Module

S-AU84

Power Amplifier Module for Japan cdmaOne

Features

- High output power : $P_o = 27.5$ dBmW (min)
- Low operating current : $I_{CC} = 415$ mA (typ.)
 $@P_o = 27.5$ dBmW $V_{CC} = 3.5$ V
 1X modulation
 $I_{CC} = 140$ mA (typ.)
 $@P_o = 17.0$ dBmW $V_{CC} = 1.3$ V
 1X modulation
- Low idle current : $I_{CC}(\text{idle}) = 52$ mA (typ.)
 $@V_{CC} = 3.5$ V, $V_{DC} = 3.6$ V,
 $V_{con} = 2.8$ V
- Low leakage current : $I_{CC}(\text{leak}) = 10$ μ A (max)
 $@V_{CC} = 3.5$ V, $V_{DC} = 3.6$ V, $V_{con} = 0$ V
- Low-voltage operation : Operation at $V_{CC} = 1.3$ V is possible.
 $@P_o = 17.0$ dBmW
- Compact package : 6.0 mm $\times$ 6.0 mm $\times$ 1.55 mm (5-6B package)



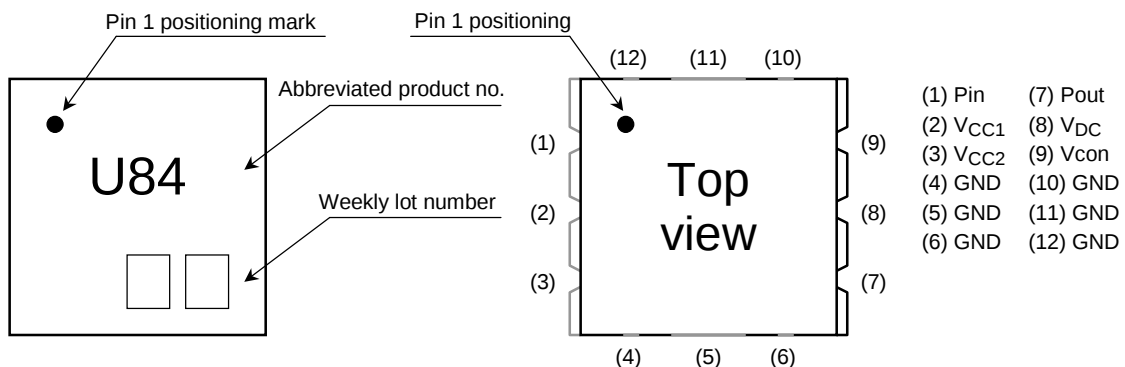
Weight: 0.12 g (typ.)

Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Supply voltage 1	V_{CC1}	6	V
Supply voltage 2	V_{CC2}	6	V
Bias circuit voltage	V_{DC}	6	V
Control voltage	V_{con}	4	V
Collector current	I_{CC}	1	A
Power dissipation	P_D (Note)	2	W
Operating temperature	T_{op}	-20 to +85	$^\circ\text{C}$
Storage temperature range	T_{stg}	-40 to +125	$^\circ\text{C}$

Note: $T_a = 25^\circ\text{C}$

Marking and Pin Assignment



Electrical Characteristics 1 (1X modulation, f = 887-925 MHz, Tc = 25°C, Zg = Zl = 50 Ω)

Characteristics	Symbol	Test Condition		Min	Typ.	Max	Unit
Collector idle current	I _{CC} (idle)	V _{CC1} = V _{CC2} = 3.5 V, V _{DC} = 3.6 V, V _{con} = 2.8 V Pi = no input		—	52	75	mA
Bias circuit current	IDC (idle)			—	0.5	2.0	mA
Control current	I _{con} (idle)			—	2.5	4.0	mA
Leakage current	I _{CC} (leak)	V _{CC1} = V _{CC2} = 3.5 V, V _{DC} = 3.6 V, V _{con} = 0 V Pi = no input		—	—	10	μA
	IDC (leak)			—	—	10	μA
Output power 1	Po1	V _{CC1} = V _{CC2} = 3.5 V, V _{DC} = 3.6 V, V _{con} = 2.8 V Pi = adjust		27.5	28.0	—	dBmW
Power gain 1	Gp1	V _{CC1} = V _{CC2} = 3.5 V, V _{DC} = 3.6 V, V _{con} = 2.8 V Po = 27.5 dBmW		25.0	27.5	—	dB
Collector current 1	I _{CC1}			—	415	440	mA
Bias circuit current 1	IDC1			—	2.5	4.0	mA
Control current 1	I _{con1}			—	3.5	5.0	mA
Input VSWR 1	VSWR _{in1}			—	2.0	3.5	—
Receiving band noise 1	NRB1			—	−139	−137	dBmW /Hz
2nd harmonics 1	2fo1			—	−35	−30	dBc
3rd harmonics 1	3fo1			—	−45	−40	dBc
Out-of-band noise 1	N-3MHz1			fo = 888 MHz	—	−45	−40
Adjacent-channel leakage power ratio 1	ACPR1	Δf = ±900 kHz (Note 2)	—	−49	−46	dBc	
Adjacent-channel leakage power ratio 2	ACPR2	Δf = ±1.98 MHz (Note 2)	—	−59	−56	dBc	
Adjacent-channel leakage power ratio 3	ACPR3	Δf = ±900 kHz (Note 2)	V _{CC1} = V _{CC2} = 3.3 V, V _{DC} = 3.3 V, V _{con} = 2.8 V Po = 26.5 dBmW	—	−50	−46	dBc
Adjacent-channel leakage power ratio 4	ACPR4	Δf = ±1.98 MHz (Note 2)		—	−62	−58	dBc
Stability 1	SPR1	V _{CC1} = V _{CC2} = 1.0 V to 4.2 V, V _{DC} = 3.6 V, V _{con} = 2.8 V, Po = 27.5 dBmW, Z _G = 50 Ω, Load VSWR = 5:1 all phase, Ta = −20°C to 85°C		—	—	−55	dBc
Load mismatch 1	—	V _{CC1} = V _{CC2} = 3.5 V, V _{DC} = 3.6 V, V _{con} = 2.8 V, Po = 0-27.5 dBmW, Pi = adjust, Z _G = 50 Ω, VSWR LOAD 7:1 all phase		No degradation			—
Power gain 2	Gp2	V _{CC1} = V _{CC2} = 1.3 V, V _{DC} = 3.6 V, V _{con} = 2.8 V, Po = 17.0 dBmW		22.0	25.5	28.0	dB
Collector current 2	I _{CC2}			—	140	160	mA
Bias circuit current 2	IDC2			—	0.8	2.5	mA
Control current 2	I _{con2}			—	2.5	4.0	mA
Adjacent-channel leakage power ratio 5	ACPR5	Δf = ±900 kHz (Note 2)		—	−50	−46	dBc
Adjacent-channel leakage power ratio 6	ACPR6	Δf = ±1.98 MHz (Note 2)		—	−64	−58	dBc

Caution: The RF power amplifier is sensitive to electrostatic discharge. When handling this product, ensure that the environment is protected against electrostatic discharge by using an earth strap, a conductive mat and an ionizer.

Electrical Characteristics 2 (IS-95 modulation, f = 887-925 MHz, Tc = 25°C, Zg = Zl = 50 Ω)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output power 2	Po2	VCC1 = VCC2 = 3.5 V, VDC = 3.6 V, Vcon = 2.8 V Pi = adjust	27.5	28.0	—	dBmW
Power gain 3	Gp3	VCC1 = VCC2 = 3.5 V, VDC = 3.6 V, Vcon = 2.8 V Po = 27.5 dBmW	25.0	27.5	—	dB
Collector current 3	ICC3		—	435	460	mA
Bias circuit current 3	IDC3		—	2.5	4.0	mA
Control current 3	ICon3		—	3.5	5.0	mA
Input VSWR 2	VSWRin2		—	2.0	3.5	—
Receiving band noise 2	NRB2		—	−138	−136	dBmW /Hz
2nd harmonics 2	2fo2		—	−35	−30	dBc
3rd harmonics 2	3fo2		—	−45	−40	dBc
Out-of-band noise 2	N-3MHz2	fo = 888 MHz	—	−44	−40	dBmW
Adjacent-channel leakage power ratio 7	ACPR7	Δf = ±900 kHz (Note 2)	—	−55	−50	dBc
Adjacent-channel leakage power ratio 8	ACPR8	Δf = ±1.98 MHz (Note 2)	—	−58	−55	dBc
Adjacent-channel leakage power ratio 9	ACPR9	Δf = ±900 kHz (Note 2)	VCC1 = VCC2 = 3.3 V, VDC = 3.3 V, Vcon = 2.8 V Po = 26.5 dBmW	−50	−46	dBc
Adjacent-channel leakage power ratio 10	ACPR10	Δf = ±1.98 MHz (Note 2)		−60	−56	dBc
Stability 2	SPR2	VCC1 = VCC2 = 1.0 V to 4.2 V, VDC = 3.6 V, Vcon = 2.8 V, Po = 27.5 dBmW, ZG = 50 Ω, Load VSWR = 5:1 all phase, Ta = −20°C to 85°C	—	—	−55	dBc
Load mismatch 2	—	VCC1 = VCC2 = 3.5 V, VDC = 3.6 V, Vcon = 2.8 V, Po = 0-27.5 dBmW, Pi = adjust, ZG = 50 Ω, VSWR LOAD 7:1 all phase	No degradation			—
Power gain 4	Gp4	VCC1 = VCC2 = 1.3 V, VDC = 3.6 V, Vcon = 2.8 V, Po = 17.0 dBmW	22.0	25.0	28.0	dB
Collector current 4	ICC4		—	145	165	mA
Bias circuit current 4	IDC4		—	0.8	2.5	mA
Control current 4	ICon4		—	2.5	4.0	mA
Adjacent-channel leakage power ratio 11	ACPR11	Δf = ±900 kHz (Note 2)	—	−50	−46	dBc
Adjacent-channel leakage power ratio 12	ACPR12	Δf = ±1.98 MHz (Note 2)	—	−64	−58	dBc

Note1: ICC = Current of a VCC1 terminal + current of a VCC2 terminal

Note2: ACPR

a) Pc (1.23 MHz) is average power measured for 1.23 MHz bandwidth with carrier frequency.

b) P (30 kHz) is average power measured for 30 kHz bandwidth with 900 kHz/1.98 MHz offset.

c) ACPR1 (or ACPR2) = P (30 kHz) – Pc (1.23 MHz) dB

Note3: These electrical characteristics are measured using Toshiba standard test board in Toshiba standard measurement system.

Electrical Characteristics 3
(1X modulation, $f = 887\text{-}925\text{ MHz}$, $T_c = -20\text{--}85^\circ\text{C}$, $Z_g = Z_l = 50\ \Omega$)

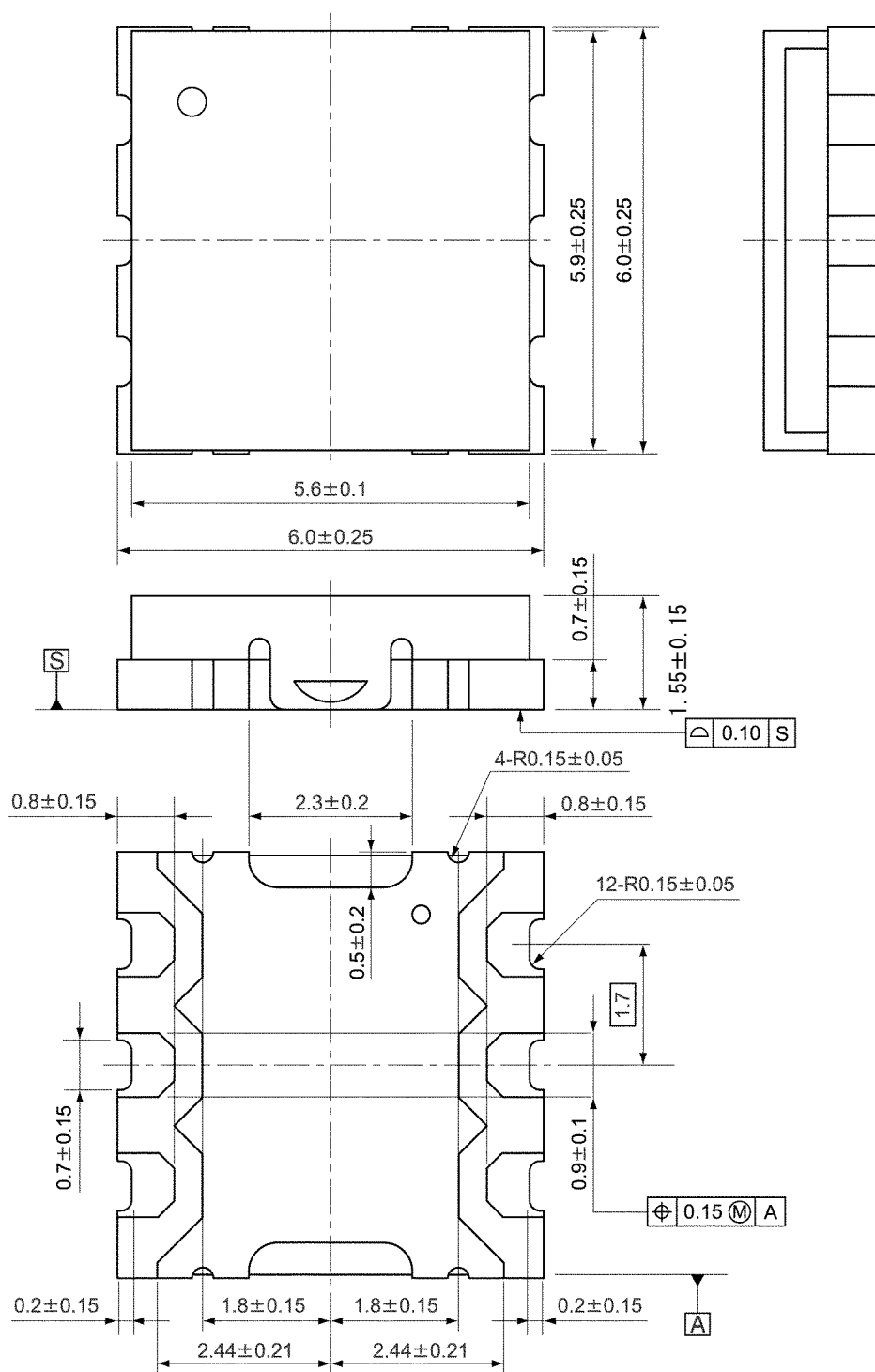
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Power gain 5	Gp5	$V_{CC1} = V_{CC2} = 3.5\text{ V}$, $V_{DC} = 3.6\text{ V}$, $V_{con} = 2.8\text{ V}$, $P_o = 27.5\text{ dBmW}$	23.5	—	—	dB
Adjacent-channel power ratio 13	ACPR13	$\Delta f = \pm 900\text{ kHz}$ (Note 2)	—	—	−45	dBc
Adjacent-channel power ratio 14	ACPR14	$\Delta f = \pm 1.98\text{ MHz}$ (Note 2)	—	—	−54	dBc

Electrical Characteristics 4
(IS-95 modulation, $f = 887\text{-}925\text{ MHz}$, $T_c = -20\text{--}85^\circ\text{C}$, $Z_g = Z_l = 50\ \Omega$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Power gain 6	Gp6	$V_{CC1} = V_{CC2} = 3.5\text{ V}$, $V_{DC} = 3.6\text{ V}$, $V_{con} = 2.8\text{ V}$, $P_o = 27.5\text{ dBmW}$	23.5	—	—	dB
Adjacent-channel power ratio 15	ACPR15	$\Delta f = \pm 900\text{ kHz}$ (Note 2)	—	—	−48	dBc
Adjacent-channel power ratio 16	ACPR16	$\Delta f = \pm 1.98\text{ MHz}$ (Note 2)	—	—	−54	dBc

Package Dimensions

Unit: mm



Weight: 0.12 g (typ.)

RESTRICTIONS ON PRODUCT USE

020704EAC

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. The dust or vapor is harmful to the body. Do not break , cut, crush or dissolve chemically.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.