Document Title

Data sheet of A7533.

Revision History

Rev. No.	History	Issue Date	Remark
0.1	Initial issue.	Jun. 25th, 2007	Preliminary
0.2	Logo changed.	Oct. 18th, 2007	
0.3	Change DC spec, truth table	Dec. 7th , 2007	
0.4	Add B type	Jan. 16th, 2008	
0.5	Modify ordering information, add top marking info., reflow profile	Apr. 17th, 2008	
0.6	Change pin definition	Jul, 15, 2008	
0.7	Modify typo of Pin 14 and Pin 16, add remark of application ckt.	Jul, 08, 2009	
0.8	Modify pin configuration 4,5,8 typo	Feb, 22, 2010	
1.0	Add ESD sensitive caution and MSL III information	July, 2010	Full Production
1.1	Change English Company Name	Nov. 30, 2010	
1.2	Modify the tape reel information and the add Shenzhen office address.	Jul. 2011	
1.3	Remark to use either 500pF or 470pF on pin 5 and pin 11.	June, 2012	

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Table of Contents

1 Typical Applications

4*2 Switch Matrix for 0.2 -3.0 GHz Applications:

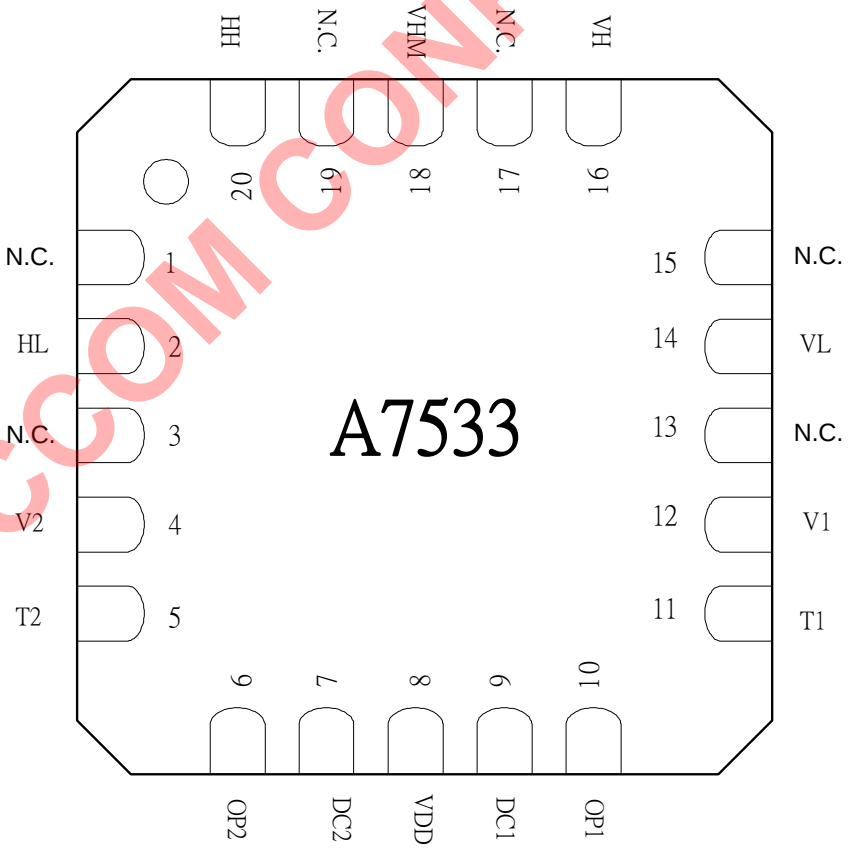
- LNB
- CATV
- Cellular Systems
- DBS

2 General Description

A7533 is a low-cost 4 x 2 switch matrix with tone detector in a 20-lead QFN package for use in RF multiplexing applications from 200 to 3000 MHz. A positive voltage controlled 4 bit decoder and tone/polarity detector are both integrated on the switch with DiSEqC control signals rejection. A7533 is ok to be used in 50/75 ohm systems.

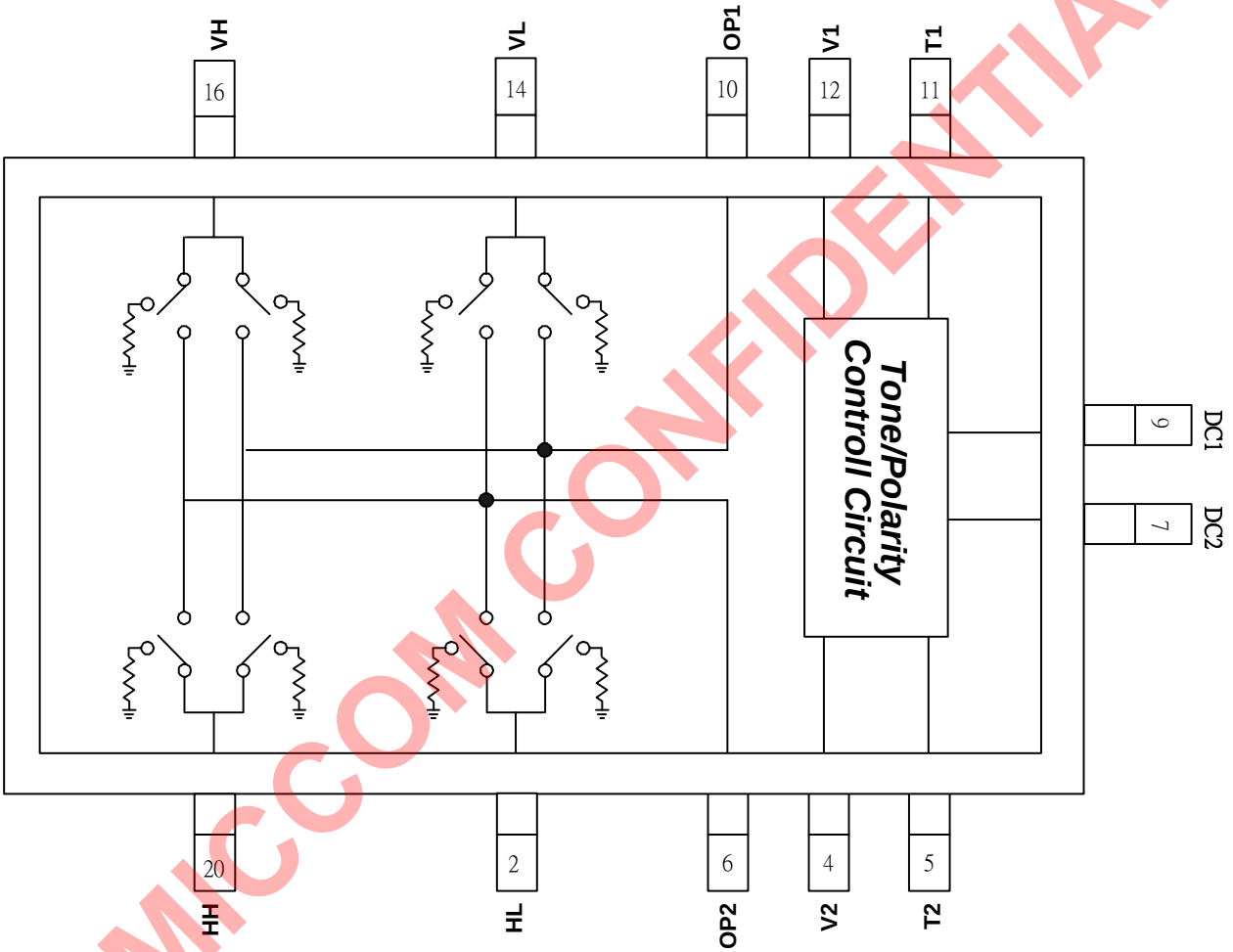
Switch outputs (OP1 & OP2) can be independently selected from any of the four inputs (HH, HL, VH, VL) or simultaneously select the same inputs. Note that the switch is bi-directional and input/output functionality may be interchanged.

3 Pin Assignments



A7533 QFN Package Top View

4 Block Diagram



5 Pin Configurations

Pin No.	Pin Name	Function
11 12	T1 V1	Tone and Polarity detector input.
4 5	V2 T2	Tone and Polarity detector input.
14 16 20 2	VL VH HH HL	RF input pin
10 6	OP1 OP2	RF output pin
8	VDD	Power pin, Connect to power.
1 3 13 15 17 19	N.C.	No connection, Connect to PCB ground.
18	VHM	Vertical-Horizontal Mirror. Connect to ground → Normal Leave open → Mirror.
7 9	DC2 DC1	By-pass , Connect to by-pass capacitor
Back side paddle	GND	Connect to ground.

6 Electrical Specifications

Typical condition: T_A = +25°C, VDD= +3.3V, 50 ohm System. All RF port are terminated to 50 ohm .

Parameter	Condition	Min.	Typ.	Max.	Units
Switch					
Insertion Loss	200 - 950 MHz 950 - 1450 MHz 1450 - 2150 MHz 2150 - 3000 MHz	6 6 6.5 7	6.5 6.5 7.5 9	8.5 7.5 8 11	dB
Isolation	200 - 950 MHz 950 - 1450 MHz 1450 - 2150 MHz 2150 - 3000 MHz	35 31 29 23	37 33 31 25		dB
Return Loss (Input; VL, HL, VH, HH)	200 - 3000 MHz	12	15		dB
Return Loss (Output; OP1, OP2)	200 - 3000 MHz	10	15		dB
Output IP3	200 - 3000 MHz	20			dBm
Input Power for 1 dB Compression	200 - 3000 MHz	15			dBm
Switching On/Off Speed t_{RISE} / t_{FALL} (10/90% RF)	200 - 3000 MHz			10	ms
Polarity and Tone Detector					
Polarity Threshold	With external 62KΩ	14	14.75	15.5	V
Tone Signal Frequency	-40~85 ℃, 650mVpp	7	22	78	KHz
Tone Signal Duty Cycle	-40~85 ℃	40	50	60	%
Tone Signal Amplitude Threshold	With external 62KΩ and 500p / 470pF	0.1	0.17		Vpp
Power supply					
Supply Voltage	-40~85 ℃	3	3.3	4.2	V
Current Consumption	-40~85 ℃	1.5	2.2	3.2	mA

Note: Tone/Polarization threshold could be tuned by change the value of external R,C. Please contact AMICCOM FAE for specified application.

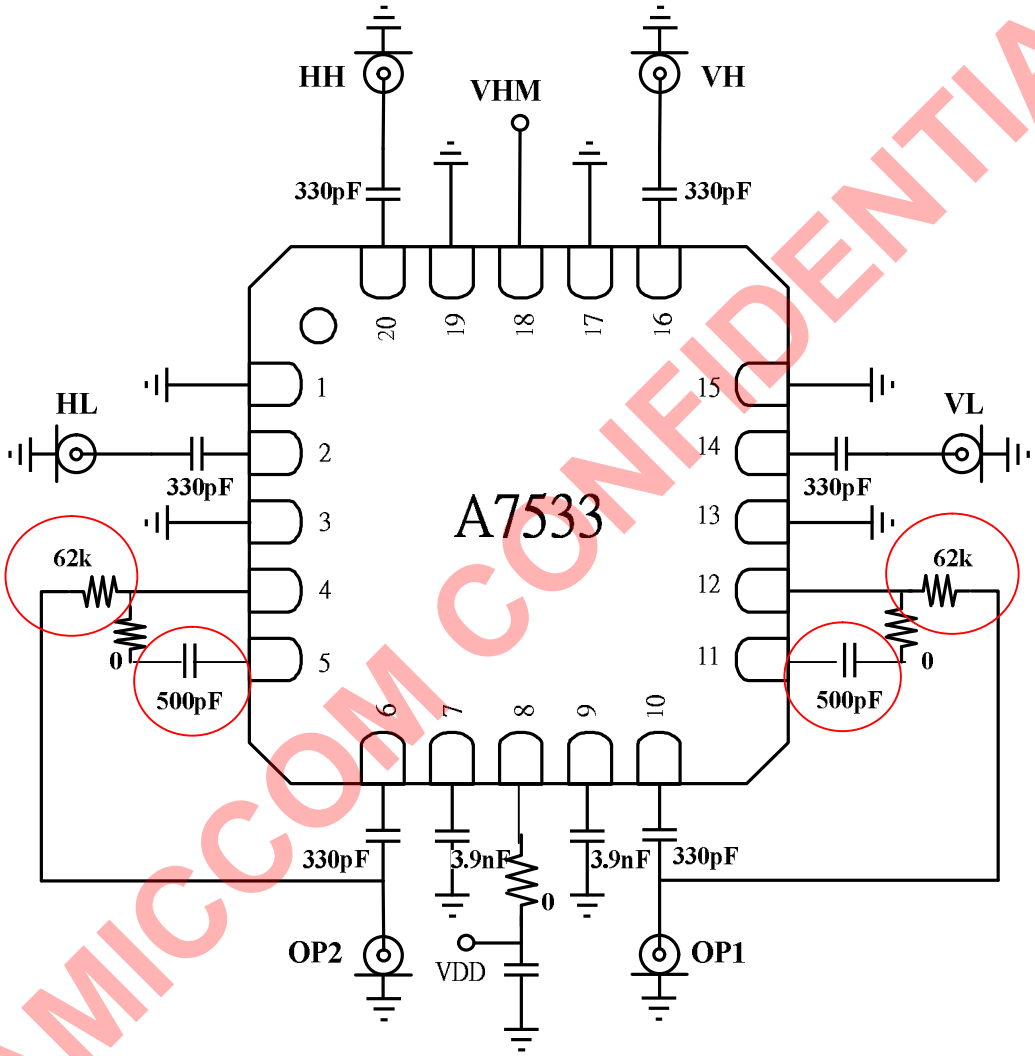
7 Absolute Maximum Ratings

Parameter	Rating
Bias Voltage Range (VDD)	+5 VDC
Storage Temperature	-65 to +150°C
Operating Temperature	-40 to +85°C
Maximum Input Power	+17 dBm (200 - 3000 MHz)

*Stresses above those listed under “Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

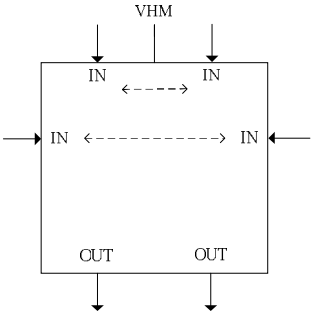
*Device is ESD sensitive. Use appropriate ESD precautions. HBM (Human Body Mode) is tested under MIL-STD-883F Method 3015.7. MM (Machine Mode) is tested under JEDEC EIA/JESD22-A115-A.
*Device is Moisture Sensitivity Level III (MSL 3).

8 Applications Circuit

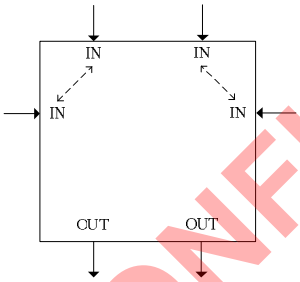


Note 1 62K ohm resistors shall be kept in 1% tolerance.
Note 2 The capacitors connected to pin 5 and pin 11 are ok to use either 500 pF or 470 pF.
Note 3 All capacitors shall be within 10 % tolerance. But, 5 % tolerance is preferred.

9 Truth Table



Above figure show the function of VHM. (Vertical/Horizontal mirror)



Above figure show the different between 7533A and 7533B (High/Low band upside down)

V1,V2 = 0 means DC voltage =9.5~14V, V1, V2=1 means DC voltage =15.5~19V
T1, T2=0 means 22KHz tone disappeared. T1, T2=1 means 22KHz tone appeared.

A7533A When pin 18 "VHM" connected to GND

	Control Input				Output to Input State	
State	V1	T1	V2	T2	OP1	OP2
1	0	0	0	0	HH	HH
2	0	0	0	1	HH	HL
3	0	0	1	0	HH	VH
4	0	0	1	1	HH	VL
5	0	1	0	0	HL	HH
6	0	1	0	1	HL	HL
7	0	1	1	0	HL	VH
8	0	1	1	1	HL	VL
9	1	0	0	0	VH	HH
10	1	0	0	1	VH	HL
11	1	0	1	0	VH	VH
12	1	0	1	1	VH	VL
13	1	1	0	0	VL	HH
14	1	1	0	1	VL	HL
15	1	1	1	0	VL	VH
16	1	1	1	1	VL	VL

A7533A When pin 18 "VHM" open. Vertical and Horizontal will be mirror.

	Control Input				Output to Input State	
State	V1	T1	V2	T2	OP1	OP2
1	0	0	0	0	VH	VH
2	0	0	0	1	VH	VL
3	0	0	1	0	VH	HH
4	0	0	1	1	VH	HL
5	0	1	0	0	VL	VH
6	0	1	0	1	VL	VL
7	0	1	1	0	VL	HH
8	0	1	1	1	VL	HL
9	1	0	0	0	HH	VH
10	1	0	0	1	HH	VL
11	1	0	1	0	HH	HH
12	1	0	1	1	HH	HL
13	1	1	0	0	HL	VH
14	1	1	0	1	HL	VL
15	1	1	1	0	HL	HH
16	1	1	1	1	HL	HL

A7533B When pin 18 "VHM" connected to GND

	Control Input				Output to Input State	
State	V1	T1	V2	T2	OP1	OP2
1	0	0	0	0	HL	HL
2	0	0	0	1	HL	HH
3	0	0	1	0	HL	VL
4	0	0	1	1	HL	VH
5	0	1	0	0	HH	HL
6	0	1	0	1	HH	HH
7	0	1	1	0	HH	VL
8	0	1	1	1	HH	VH
9	1	0	0	0	VL	HL
10	1	0	0	1	VL	HH
11	1	0	1	0	VL	VL
12	1	0	1	1	VL	VH
13	1	1	0	0	VH	HL
14	1	1	0	1	VH	HH
15	1	1	1	0	VH	VL
16	1	1	1	1	VH	VH

A7533B When pin 18 "VHM" open. Vertical and Horizontal will be mirror.

	Control Input				Output to Input State	
State	V1	T1	V2	T2	OP1	OP2
1	0	0	0	0	VL	VL
2	0	0	0	1	VL	VH
3	0	0	1	0	VL	HL
4	0	0	1	1	VL	HH
5	0	1	0	0	VH	VL
6	0	1	0	1	VH	VH
7	0	1	1	0	VH	HL
8	0	1	1	1	VH	HH
9	1	0	0	0	HL	VL
10	1	0	0	1	HL	VH
11	1	0	1	0	HL	HL
12	1	0	1	1	HL	HH
13	1	1	0	0	HH	VL
14	1	1	0	1	HH	VH
15	1	1	1	0	HH	HL
16	1	1	1	1	HH	HH

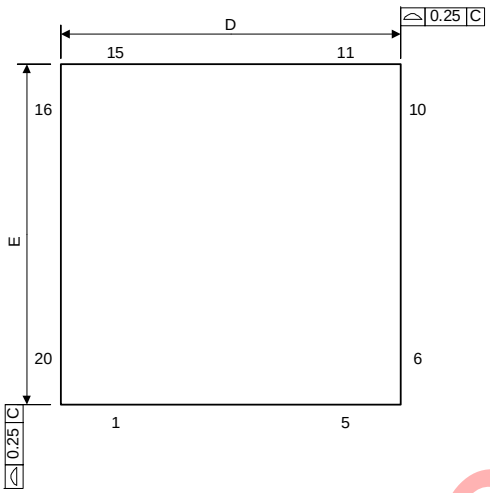
10 Ordering Information

Part No.	Package	Units Per Reel / Tray
A75X33AQF/Q	QFN20L, Pb Free, Tape & Reel, -40℃～85℃	3K
A75X33AQF	QFN20L, Pb Free, Tray, -40℃～85℃	490EA
A75X33BQF/Q	QFN20L, Pb Free, Tape & Reel, -40℃～85℃	3K
A75X33BQF	QFN20L, Pb Free, Tray, -40℃～85℃	490EA

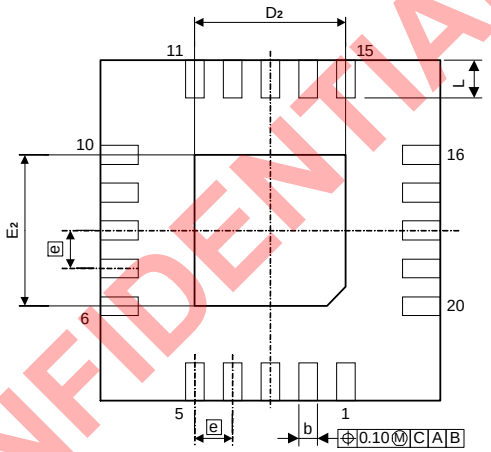
11 Package Information

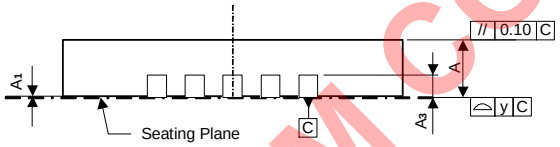
QFN 20L (4 X 4 X 0.8mm) Outline Dimensions unit: inches/mm

TOP VIEW



BOTTOM VIEW



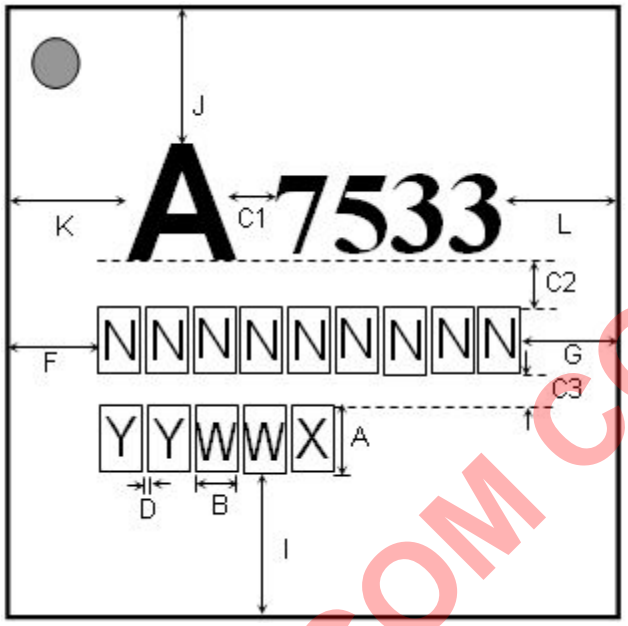


Symbol	Dimensions in inches			Dimensions in mm		
	Min	Nom	Max	Min	Nom	Max
A	0.028	0.030	0.032	0.70	0.75	0.80
A_1	0.000	0.001	0.002	0.00	0.02	0.05
A_3	0.008 REF			0.203 REF		
b	0.007	0.010	0.012	0.18	0.25	0.30
D	0.154	0.158	0.161	3.90	4.00	4.10
D_2	0.075	0.079	0.083	1.90	2.00	2.10
E	0.154	0.158	0.161	3.90	4.00	4.10
E_2	0.075	0.079	0.083	1.90	2.00	2.10
e	0.020 BSC			0.50 BSC		
L	0.012	0.016	0.020	0.30	0.40	0.50
y	0.003			0.08		

12 Top Marking Information

A75X33AQF

- Part No. : **A75X33AQF**
- Pin Count : **20**
- Package Type : **QFN**
- Dimension : **4*4 mm**
- Mark Method : **Laser Mark**
- Character Type : **Arial**



❖ CHARACTER SIZE : (Unit in mm)

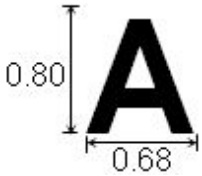
A : 0.55
B : 0.36
C1 : 0.25 C2 : 0.3 C3 : 0.2
D : 0.03

F=G
I=J
K=L

Y Y W W : DATECODE

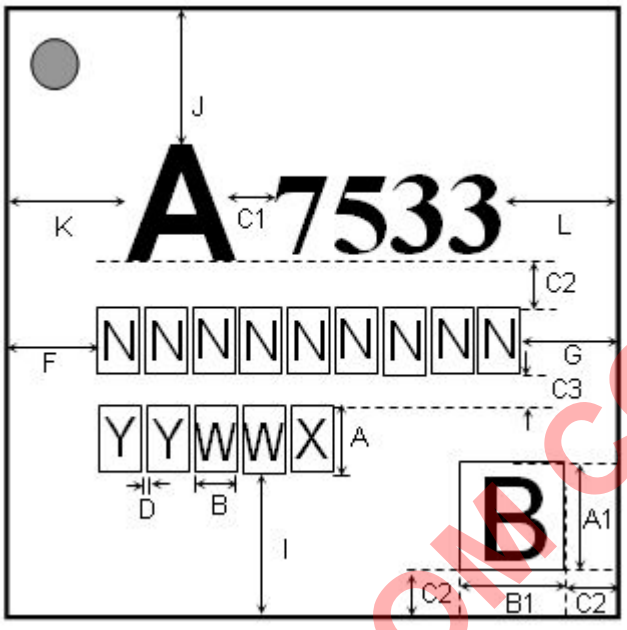
X : PKG HOUSE ID

N N N N N N N N N : LOT NO.
(max. 9 characters)



A75X33BQF

- Part No. : **A75X33BQF**
- Pin Count : **20**
- Package Type : **QFN**
- Dimension : **4*4 mm**
- Mark Method : **Laser Mark**
- Character Type : **Arial**



❖ CHARACTER SIZE : (Unit in mm)

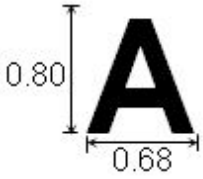
A : 0.55 **A1 : 0.75**
B : 0.36 **B1 : 0.7**
C1 : 0.25 **C2 : 0.3** **C3 : 0.2**
D : 0.03

F=G
I=J
K=L

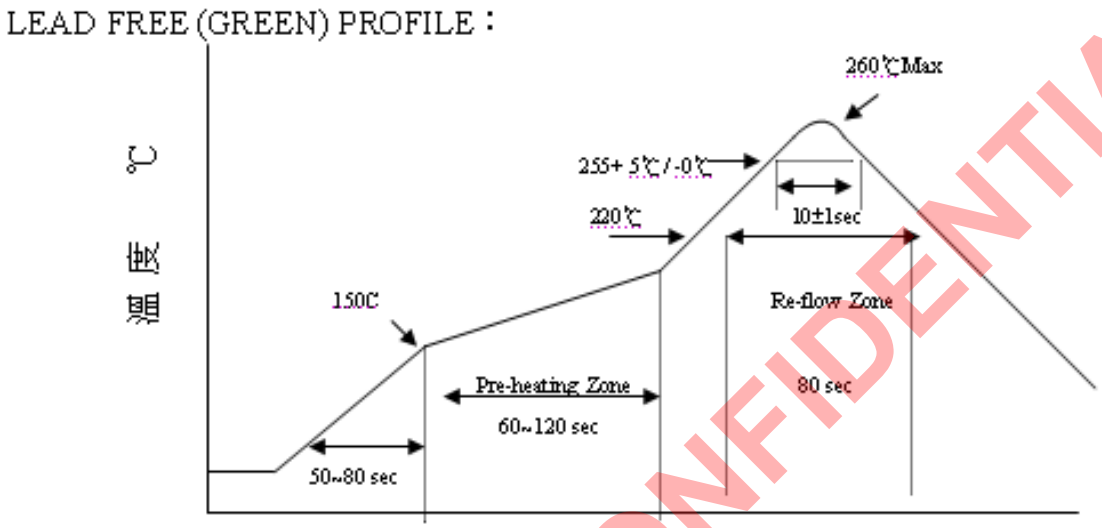
Y Y W W : DATECODE

X : PKG HOUSE ID

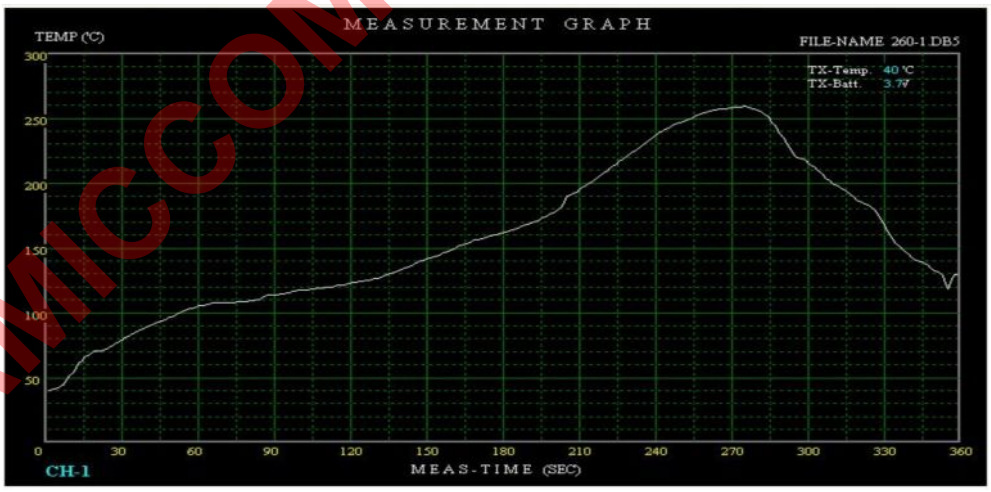
N N N N N N N N N : LOT NO.
(max. 9 characters)



13 Reflow Profile

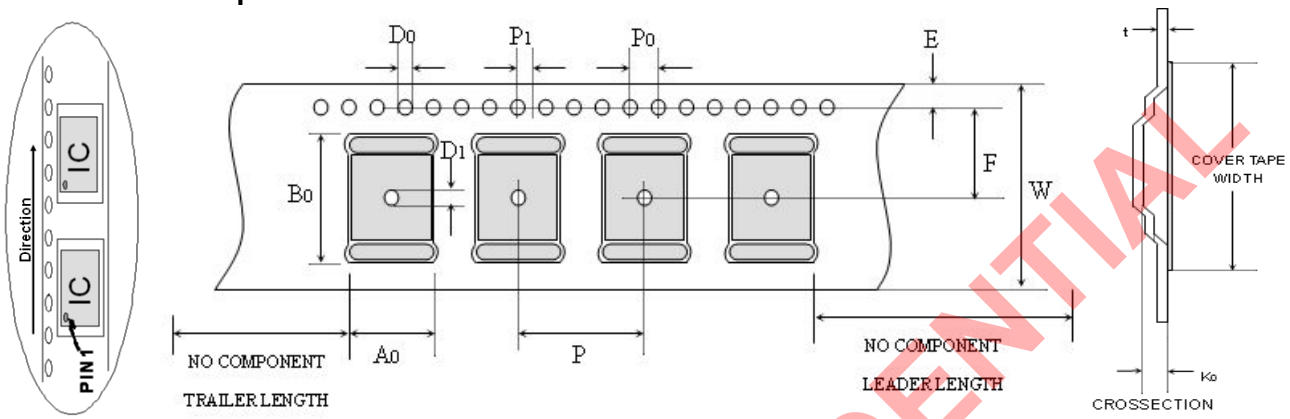


Actual Measurement Graph



14 Tape Reel Information

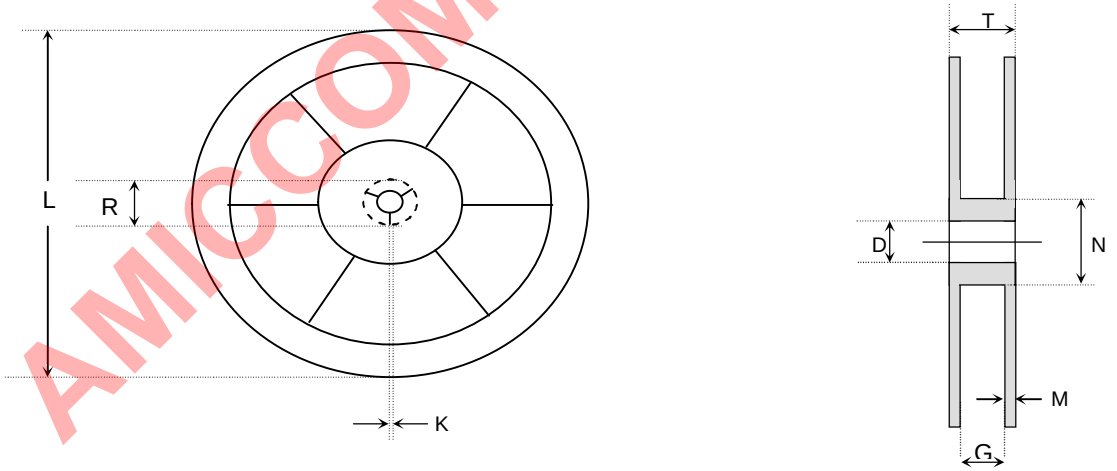
Cover / Carrier Tape Dimension



Unit: mm

TYPE	P	A0	B0	P0	P1	D0	D1	E	F	W	K0	t	Cover tape width
QFN3*3	8±0.1	3.2 5±0.1	3.25 ±0.1	4±0.2	2±0.1	1.5±0.1	1.5	1.75 ±0.1	5.5 ±0.05	12±0.3	1.25 ±0.1	0.3 ±0.05	9.3±0.1
QFN 4*4	8±0.1	4.35 ±0.1	4.35 ±0.1	4±0.2	2±0.1	1.5±0.1	1.5	1.75 ±0.1	5.5 ±0.05	12±0.3	1.2 5±0.1	0.3 ±0.05	9.3±0.1
QFN 5*5	8±0.1	5.25 ±0.1	5.25 ±0.1	4±0.2	2±0.1	1.5±0.1	1.5	1.75 ±0.1	5.5 ±0.05	12±0.3	1.25 ±0.1	0.3 ±0.05	9.3±0.1
SSOP	12±0.1	8.2±1	8.8±1.5	4.0±0.1	2.0±0.1	1.5±0.1	1.5±0.1	1.75 ±0.1	7.5±0.1	16±0.1	2.1±0.4	0.3 ±0.05	13.3 ±0.1

REEL DIMENSIONS



Unit: mm

TYPE	G	N	M	D	K	L	R
QFN	12.9±0.5	102 REF±2.0	2.3±0.2	13.15±0.35	2.0±0.5	330±3.0	19.6±2.9
SSOP	16.3±1	102 REF±2.0	2.3±0.2	13.15±0.35	2.0±0.5	330±3.0	19.6±2.9

15 Product Status

Data Sheet Identification	Product Status	Definition
Objective	Planned or Under Development	This data sheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	Engineering Samples and First Production	This data sheet contains preliminary data, and supplementary data will be published at a later date.AMICCOM reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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RF ICs AMICCOM

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