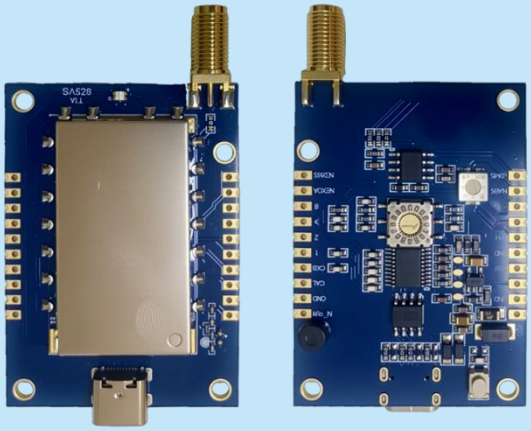
SA528 UV Dual Frequency Walkie-talkie Module

- UHF:400-470MHz & VHF:136-174MHz
- Independent transmission and reception frequency, supporting the sending of voice and data
- 38 levels of CTCSS, 166 levels of CDCSS
- U/V power @ 4V 1W/0.5W optional

Product Specification



Catalogue

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Note: Revision History

Revision	Date	Comment
V1.0	2026-4	First release
V1.1	2026-5	Update the pin description

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1. Description

The SA528 is a cost-effective, highly integrated U/V dual-band professional walkie-talkie module. It integrates a high-speed microcontroller, a high-performance RF transceiver chip, and an RF power amplifier, delivering reliable and efficient wireless communication performance.The module provides a standard serial interface, enabling users to easily configure parameters and control transmit/receive functions. By simply connecting an external speaker to this module, it can function as a compact walkie-talkie. The Type-C interface and ultra-compact size enable a wide range of applications. With PC software for parameter configuration, it can easily communicate with off-the-shelf analog walkie-talkies on the market. It can be easily embedded into various portable and handheld devices, significantly enhancing overall system performance and integration efficiency.

The SA528 is manufactured and tested using lead-free processes and fully complies with RoHS and REACH environmental standards.

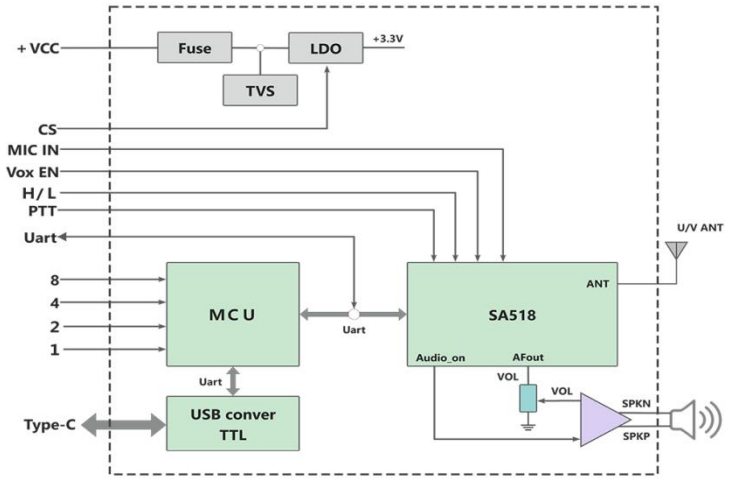
2. Features

- UHF band frequency: 400~470 MHz
  VHF band frequency: 136~174 MHz
  (Note: The above frequency modules can simultaneously support)
- Independent transmit and receive frequency
- Band width 12.5KHz / 25 KHz
- RSSI signal strength indicator
- Distance up to 4-5km in open area
- High Sensitivity:-124 dBm
- Support wireless data transmission and reception
- TCXO crystal, Stable performance
- 38 CTCSS
- 166 codes of normal/reverse CDCSS digital squelch
- 8 level squelch & 8 adjustable volume
- High/ low power is optional (500mW/1W)
- Wide range of working voltage:3.3-5V
- Built in EEPROM, data saved in case of power failure
- High integration, Ultra-compact size

3. Application

- Small walkie talkie
- Invisible intercom system
- Audio surveillance system
- Outdoor Sport products
- Building community security system

4. Internal block diagram



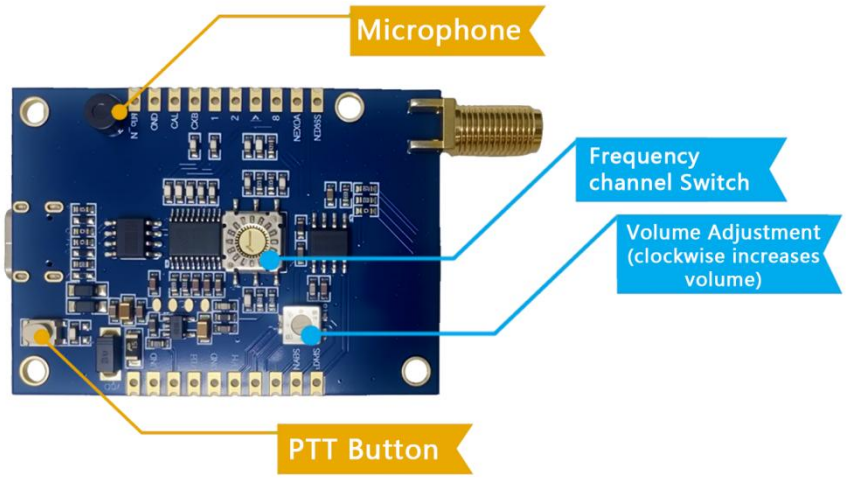
5. Specification

Parameter	Test condition	Min	Typ.	Max	Unit
Power supply		3.3	4.2	5	V
Working Temperature range		-30	25	70	℃
Current Consumption					
Sleep current			≤75		uA
RX current			76		mA
TX current(High power)	@4.0V,1W	700	800	900	mA
TX current(low power)	@4.0V,0.5W	500	600	700	mA
Transmitting RF Parameters					
Frequency range	UHF	400		470	MHz
	VHF	136		174	MHz
Out power(high power)	@VCC=4.0V	29	30	31	dBm
Out power(low power)		26	27	27.5	dBm
Modulation frequency	@1.5KHz/2.5KHz frequency deviation		10		mV
Audio modulation distortion			2	5	%
Signal toNoise Ratio		38	40	45	dB
adjacent-channel power	@12.5K offset		-60		dBc
CTCSS Modulation frequency		0.35	0.5	0.75	KHz
Receiving RF Parameters					
Receiving sensitivity	13dB output voice signal ratio	-120	-124		dBm
Receiving SNR	@1.5KHzfrequency deviation	45	50		dB
Audio output amplitude			700		mV
Audio Output impedance			200		Ohm

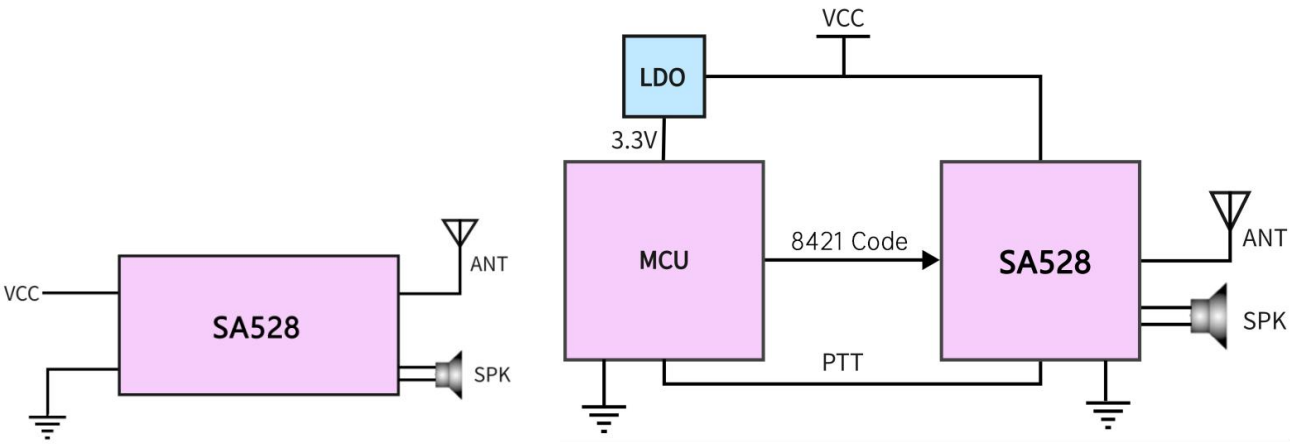
6. Voltage and Power Comparison Table

Working voltage (V)	150.75MHz		416.75MHz	
	Power(dBm)	Current(mA)	Power(dBm)	Current(mA)
3.3	28.2	620	26.9	624
3.6	29.4	691	28.7	808
4.0	30.1	777	29.8	901
4.5	30.9	913	30.8	984
5.0	31.5	1030	31.7	1070

7. Interface description

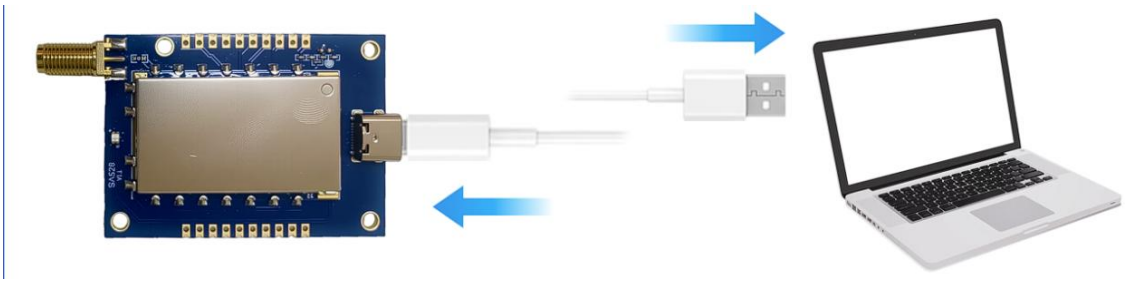


8. Typical application schematic



9. Parameter configuration

The module provides a Type-C interface. Users can adjust and read module parameters by sending commands through the serial port. The module integrates built-in memory, so all configured parameters can be saved even when power is disconnected. We also provide PC configuration software to customers free of charge. Simply connect the module to the PC via a USB cable to easily adjust the internal RF parameters. The connection is shown in the figure below:





- TX channel:Transmitting frequency, 16 groups in total.Factory default settings are shown in the interface above. Groups 1-8 are VHF frequencies (150.75-157.75 MHz), and groups 9-16 are UHF frequencies (409.75-416.75 MHz). Users can also change them as needed.
- RX channel:Receiving frequency: 16 groups in total. Factory default settings are shown in the interface above. Groups 1-8 are VHF frequencies (150.75-157.75 MHz), and groups 9-16 are UHF frequencies (409.75-416.75 MHz). Users can also change them as needed.
- TX CTCS: transmitting CTCSS, 38 level for option,Factory Default is 0.
- TX CDCS: transmitting CDCSS, 166 level for option,Factory Default is 0.
- RX CTCS: receiving CTCSS, 38 level for option,Factory Default is 0.
- RX CDCS: receiving CDCSS, 166 level for option,Factory Default is 0.
- SQ:receiving Squelch level,8 level for option,Default is 1.

★ Note: For CTCSS and CDCSS ,user can choose one of them to use.

10. Communication protocol

Commands Format:

After module running, the standard setting of serial port as below:

Rate: 9600 bps Data bit: 8 bit Stop bit: 1 bit Parity bit: none

Commands return format:

Success return: OK\r\n, failure return: ERROR\r\n

Frame format definition:

All instructions in the communication protocol are transmitted in ASCII code.

★ Note: Please refer to Appendix 1 for the corresponding CTCSS/CDCSS values

➢ **Read the product model and version number instructions of the module**

Format: AA FA A

The return value is:SA528_VERx.x\r\n

Example: AA FA A (Hexadecimal: 0x41 0x41 0x46 0x41 0x41)

Return: SA528_VER1.0\r\n

(Hexadecimal: 0x53 0x41 0x35 0x32 0x38 0x5F 0x56 0x45 0x52 0x31,0x2E,0x30,0x0D 0x0A)

➢ **Read the parameter instructions currently set by the module**

Format: AA FA 1

Return: AA FA TFV1,RFV2,.....,TFV16,RFV16,TX_SUBAUDIO,RX_SUBAUDIO,SQ

The parameter description can be found in the settings group instruction.

Example: AA FA 1 (hexadecimal 0x41 0x41 0x46 0x41 0x31)

Return: AA

450.1250,450.1250,451.1250,451.1250,452.1250,452.1250,453.1250,453.1250,454.1250,454.125
0,455.1250,455.1250,456.1250,456.1250,457.1250,457.1250,458.1250,458.1250,459.1250,459.12
50,455.0250,455.0250,455.1250,455.1250,455.2250,455.2250,455.3250,455.3250,455.4250,455.4
250,455.5250,455.5250,011,125,8
(Hexadecimal 41 41 34 35 30 2e 31 32 35 30 2c 34 35 30 2e 31 32 35 30 2c 34 35 31 2e 31 32 35
30 2c 34 35 31 2e 31 32 35 30 2c 34 35 32 2e 31 32 35 30 2c 34 35 32 2e 31 32 35 30 2c 34 35 33
2e 31 32 35 30 2c 34 35 33 2e 31 32 35 30 2c 34 35 34 2e 31 32 35 30 2c 34 35 34 2e 31 32 35 30
2c 34 35 35 2e 31 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 36 2e 31 32 35 30 2c 34 35 36 2e
31 32 35 30 2c 34 35 37 2e 31 32 35 30 2c 34 35 37 2e 31 32 35 30 2c 34 35 38 2e 31 32 35 30 2c
34 35 38 2e 31 32 35 30 2c 34 35 39 2e 31 32 35 30 2c 34 35 39 2e 31 32 35 30 2c 34 35 35 2e 30
32 35 30 2c 34 35 35 2e 30 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34
35 35 2e 32 32 35 30 2c 34 35 35 2e 32 32 35 30 2c 34 35 35 2e 33 32 35 30 2c 34 35 35 2e 33 32
35 30 2c 34 35 35 2e 34 32 35 30 2c 34 35 35 2e 34 32 35 30 2c 34 35 35 2e 35 32 35 30 2c 34 35
35 2e 35 32 35 30 2c s30 31 31 2c 31 32 35 2c 38 0d 0a)

➢ **Factory Default Parameter Command**

Format: AA FA 2

Return value: “OK\r\n” or “ERROR\r\n”

Example: AA FA 2 (hexadecimal 41 41 46 41 32)

Return: OK\r\n (hexadecimal 4f 4b 0d 0a)

➢ **Set Group Command**

Description:This command tells the module the setting information of the working parameters.

Format: AA FA 3 TFV1,RFV2,.....,TFV16,RFV16,TX_SUBAUDIO,RX_SUBAUDIO,SQ

Parameter Description: TX_SUBAUDIO: TX CTCSS/CDCSS value

RX_SUBAUDIO: RX CTCSS/CDCSS value

SQ:Quiet level (0～8) (0: Listening mode, scanning mode cannot use 0)

(Note: Different Sub-tone values can be used for TX and RX, 000: no encoding 001--038: CTCSS, 039--204: CDCSS. CDCSS displays the code on the configuration software interface, and the data and code sent are shown in Appendix 1.)

Example: AA FA 3

450.1250,450.1250,451.1250,451.1250,452.1250,452.1250,453.1250,453.1250,454.1250,454.1250,455.1250,455.1250,456.1250,456.1250,457.1250,457.1250,458.1250,458.1250,459.1250,459.1250,455.0250,455.0250,455.1250,455.1250,455.2250,455.2250,455.3250,455.3250,455.4250,455.4250,455.5250,455.5250,011,125,8

(Hexadecimal41 41 46 41 33 34 35 30 2e 31 32 35 30 2c 34 35 30 2e 31 32 35 30 2c 34 35 31 2e 31 32 35 30 2c 34 35 31 2e 31 32 35 30 2c 34 35 32 2e 31 32 35 30 2c 34 35 32 2e 31 32 35 30 2c 34 35 33 2e 31 32 35 30 2c 34 35 33 2e 31 32 35 30 2c 34 35 34 2e 31 32 35 30 2c 34 35 34 2e 31 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 36 2e 31 32 35 30 2c 34 35 36 2e 31 32 35 30 2c 34 35 37 2e 31 32 35 30 2c 34 35 37 2e 31 32 35 30 2c 34 35 38 2e 31 32 35 30 2c 34 35 38 2e 31 32 35 30 2c 34 35 39 2e 31 32 35 30 2c 34 35 39 2e 31 32 35 30 2c 34 35 35 2e 30 32 35 30 2c 34 35 35 2e 30 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 35 2e 31 32 35 30 2c 34 35 35 2e 32 32 35 30 2c 34 35 35 2e 32 32 35 30 2c 34 35 35 2e 33 32 35 30 2c 34 35 35 2e 33 32 35 30 2c 34 35 35 2e 34 32 35 30 2c 34 35 35 2e 34 32 35 30 2c 34 35 35 2e 35 32 35 30 2c 34 35 35 2e 35 32 35 30 2c s30 31 31 2c 31 32 35 2c 38 0d 0a)

Return value: “OK\r\n” or “ERROR\r\n”

OK\r\n (Hexadecimal: 4f 4b 0d 0a)

➢ **Set SMS Content Command**

Description: This command tells the module what data needs to be sent

Format: AA FA4 data1 data2 ……dataN

Example: AA FA4 0123456789 (hexadecimal 41 41 46 41 34 30 31 32 33 34 35 36 37 38 39,sending content as string 0123456789, sending length of 10 bytes, maximum sending byte per time is 19 bytes)

Return value: “OK\r\n” (hexadecimal 4f 4b 0d 0a) or “+ERROR\r\n”

Note:

① Considering the switching of modes and the processing and response time of data by both parties, if data transmission and reception are frequent, it is recommended to send at intervals of 1-2 seconds, with a recommended value of 1.5 seconds

② The frequency guarantee for both the sender and receiver is the same. When transmitting and receiving data with SQ (noise level (0-8)), 0 cannot be used

➢ **Automatic SMS Content Upload Command**

Description: This command is automatically uploaded by the module after receiving data

Format: AAFA5 data1 data2 ……dataN

Example: AAFA50123456789\r\n Received SMS content as string 0123456789

➢ **Set bandwidth to 12.5K/25K Command**

Format: AAFA60

The return value is: OK\r\n or " +ERROR\r\n"

Example: AAFA60 or AAFA61 (hexadecimal: 0x41 0x41 0x46 0x41 0x36 0x30)

Return: OK\r\n (hexadecimal 4f 4b 0d 0a)

➢ **Read bandwidth 12.5K/25K Command**

Format: AAFA7

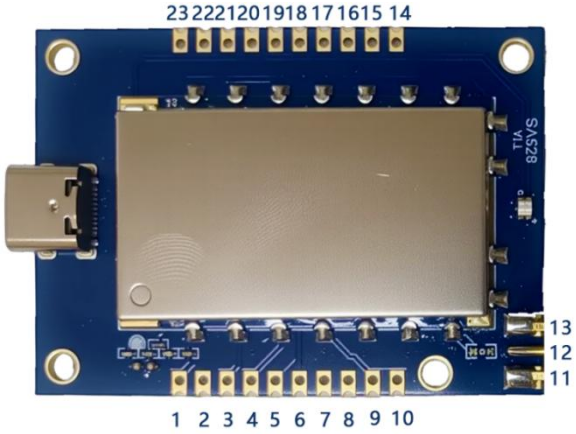
The return value is: AA0\r\n or AA1\r\n

Example: AAFA7 (Hexadecimal: 0x41 0x41 0x46 0x41 0x37)

Return: AA0\r\n or AA1\r\n 0:12.5K 1:25K

(Hexadecimal: 0x41 0x41 0x30)

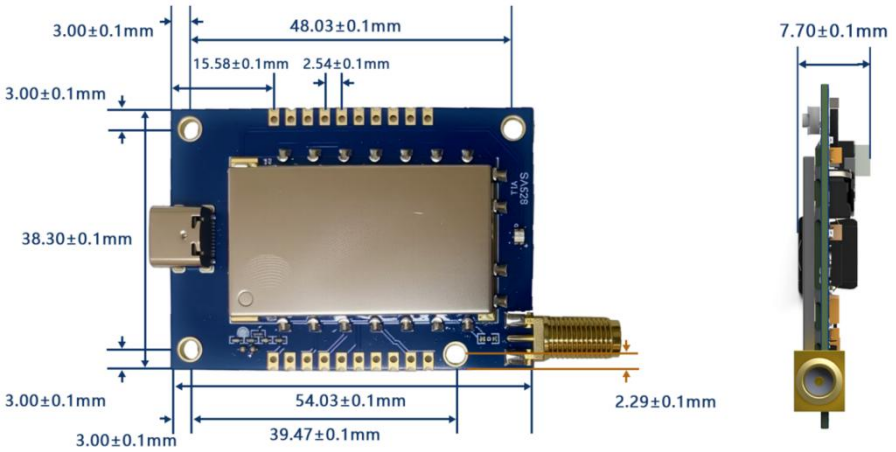
11. Pin definition



Pin NO.	Pin name	I/O	I/O Voltage	I/O state
1	MIC_IN	I		Microphone signal input. An external microphone requires an external bias resistor.
2,11,13,19	GND			Grounding
3	TXD	O	0-3.3V	Serial port for sending data
4	RXD	I	0-3.3V	Serial port receiving data port **(Note: in module sleep mode, the user device needs to output a low level to prevent leakage or poor reset)**
5	1	I	0-3.3V	Frequency 16-channel 8421 encoding, Bit 1, default "1" output.
6	2	I	0-3.3V	Frequency 16-channel 8421 encoding, Bit 2, default "1" output.
7	4	I	0-3.3V	Frequency 16-channel 8421 encoding, Bit 4, default "1" output.
8	8	I	0-3.3V	Frequency 16-channel 8421 encoding, Bit 8, default "1" output.
9	VOXEN	I	0-3.3V	Default: No function. (This pin can be customized as "VOX enable pin". Note: The VOX version does not support data transmission)
10	SPKEN	O	0-3.3V	Receive signal indicator. High in idle state; goes low when a signal is received.
12	ANT			RF input/output pin (connect to 50Ω antenna).
14	SPKP	O		Audio output pin. Connect to 8Ω / 2W speaker.
15	SKPN	O		Audio output pin. Connect to 8Ω / 2W speaker.
16	VOL-	O		SA518 module volume output pin. Internally connected to a potentiometer pin. The customer may leave this pin floating if no external volume potentiometer is needed. If an external volume potentiometer is required, the on-board potentiometer must be removed.

17	VOL+	I		Audio input pin for onboard power amplifier. Internally connected to a potentiometer pin. The customer may leave this pin floating if no external volume potentiometer is needed. If an external volume potentiometer is required, the on-board potentiometer must be removed.
18	H/L	I	0-3.3V	High/Low output power control; Leave open for high output power,low level to low output power.
20	PTT	I	0-3.3V	Transmit/Receive control pin. Floating or pulling up is receive mode; pulling down is transmit mode.
21	CS	I	0-3.3V	Module sleep control pin. High level = active (normal operation); low level = sleep. Default high (internal pull-up).
22	GND			Grounding
23	VCC	I	0-5V	Connect power positive

12. Mechanism Dimension (Unit:mm)



13. FAQ

a) Why module can not communicate properly?

1) Check if there is power connection error:

2) Check if Module is in normal communication mode:

3) Check if frequency, channel, and Sub-tone are same:

4) Check if module is damaged.

b) Why transmission distance is not far as it should be?

1) Power supply ripple is too large:

2) The antenna types do not match, or not installed properly:

3) The same frequency interference;The surrounding environment is harsh, strong interference sources.

Appendix 1:Sub-tone interface display and send correspondence table

★Note: N code is inverted corresponding to I code, such as 023N code is 023I code is inverted:

023N=~023I=00110111111000111001000

Code	Transform Bit Pattern	Hex Bit Pattern
023I	11001000000111000110111	640E37
025I	10101000000111101101011	540F6B
026I	01101000000110111010011	340DD3
031I	10011000000111111000101	4C0FC5
032I	01011000000110101111101	2C0D7D
043I	11000100000101101101101	620B6D
047I	11100100000110111111000	720DF8
051I	10010100000101010011111	4A0A9F
054I	00110100000100101111011	1A097B
065I	10101100000110001011101	560C5D
071I	10011100000110011110011	4E0CF3
072I	01011100000111001001011	2E0E4B
073I	11011100000101100111010	6E0B3A
074I	00111100000111100010111	1E0F17
114I	00110010000101111010110	190BD6
115I	10110010000111010100111	590EA7
116I	01110010000110000011111	390C1F
125I	10101010000111011110000	550EF0
131I	10011010000111001011110	4D0E5E
132I	01011010000110011100110	2D0CE6
134I	00111010000110110111010	1D0DBA
143I	11000110000101011110110	630AF6
152I	01010110000100110111100	2B09BC
155I	10110110000110110010001	5B0D91
156I	01110110000111100101001	3B0F29
162I	01001110000100111101011	2709EB
165I	10101110000110111000110	570DC6

172I	010111100001111110100000	2F0FD0
174I	001111100001110100011100	1F0E8C
205I	101000010001100101110111	508CBB
223I	110010010001011100010111	648B8B
226I	011010010001000011011111	34886F
243I	110001010001110110100001	628ED1
244I	001001010001010111111100	128AFC
245I	101001010001111100011101	528F8D
251I	100101010001111001000111	4A8F23
261I	100011010001111011101000	468F74
263I	110011010001000101111101	6688BD
265I	101011010001001111000001	5689E1
271I	100111010001001010011111	4E894F
306I	011000110001111100110000	318F98
311I	100100110001101100011110	498D8E
315I	101100110001011000110111	598B1B
331I	100110110001011111000101	4D8BE2
343I	110001110001111010010101	638F4A
346I	011001110001100101011101	338CAE
351I	100101110001110101110000	4B8EB8
364I	001011110001101000010111	178D0B
365I	101011110001000011110101	57887A
371I	100111110001000110101000	4F88D4
411I	100100001001011011101111	484B77
412I	010100001001001110011111	2849CF
413I	110100001001100101111101	684CBE
423I	110010001001100111010011	644CE9
431I	100110001001101000110111	4C4D1B
432I	010110001001111101000111	2C4FA3
445I	101001001001000111011111	5248EF
464I	001011001001011111100101	164BF2
465I	101011001001110100000111	564E83

466I	01101100100110000111011	364C3B
503I	11000010100101100011110	614B1E
506I	01100010100100011111010	3148FA
516I	01110010100111011000001	394EC1
532I	01011010100111000111000	2D4E38
546I	01100110100101111001100	334BCC
565I	10101110100111100011000	574F18
606I	01100001100110011011101	30CCDD
612I	01010001100110001110011	28CC73
624I	00101001100110101111000	14CD78
627I	11101001100111111000000	74CFC0
631I	10011001100100010100111	4CC8A7
632I	01011001100101000011111	2CCA1F
654I	00110101100111000011001	1ACE19
662I	01001101100111100010010	26CF12
664I	00101101100111001001110	16CE4E
703I	11000011100111010100010	61CEA2
712I	01010011100110111101000	29CDE8
723I	11001011100100011001110	65C8CE
731I	10011011100100100111100	4DC93C
732I	01011011100101110000100	2DCB84
734I	00111011100101011011000	1DCAD8
743I	11000111100110110010100	63CD94
754I	00110111100111110000010	1BCF82

Appendix 2:Analog subtone comparison table

Subtone coding	1	2	3	4	5	6	7	8	9	10
Sub-audio frequency	67	71.9	74.4	77	79.7	82.5	85.4	88.5	91.5	94.8
Subtone coding	11	12	13	14	15	16	17	18	19	20

Sub-audio frequency	97.4	100	103.5	107.2	110.9	114.8	118.8	123	127.3	131.8
Subtone coding	21	22	23	24	25	26	27	28	29	30
Sub-audio frequency	136.5	141.3	146.2	151.4	156.7	162.2	167.9	173.8	179.9	186.2
Subtone coding	31	32	33	34	35	36	37	38		
Subtone coding	192.8	203.5	210.7	218.1	225.7	233.6	241.8	250.3		

Appendix 3:SMD Reflow Chart

