

SAW duplexer Automotive telematics LTE band 28b

Series/type: B4427

Ordering code: B39791B4427P810

Date: May 26, 2017

Version: 2.0

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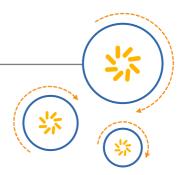
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RF360 Europe GmbH
A Qualcomm – TDK Joint Venture



SAW components

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SAW duplexer 733 / 788 MHz

Data sheet

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SAW duplexer 733 / 788 MHz

Data sheet

Table of contents

1 Application	4
2 <u>Features</u>	4
3 <u>Package</u>	5
4 Pin configuration	5
5 Matching circuit	
6 Characteristics	
7 Maximum ratings	10
8 Transmission coefficients	11
9 Reflection coefficients	14
10 Packing material	15
11 <u>Marking</u>	18
12 Soldering profile	19
13 Annotations	20
14 <u>Cautions and warnings</u>	21
Important notes.	



SAW duplexer 733 / 788 MHz

Data sheet

1 Application

- Low-loss SAW duplexer for band 28 systems
- Low insertion attenuation
- Low amplitude ripple
- Usable pass band 30 MHz
- Duplexer for higher part of band 28 (block b)
- Companion type is B4426 for low band 28 (block a)

2 Features

- Package size 2.0±0.1 mm × 1.6±0.1 mm
- Package height 0.45 mm (max.)
- Approximate weight 6 mg
- RoHS compatible
- Package for Surface Mount Technology (SMT)
- Ni/Au-plated terminals
- Filter surface passivated
- Electrostatic Sensitive Device (ESD)
- Moisture Sensitivity Level 2a (MSL2a)
- AEC-Q200 qualified component family (Grade 3: -40 °C to +85 °C)

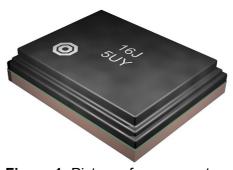
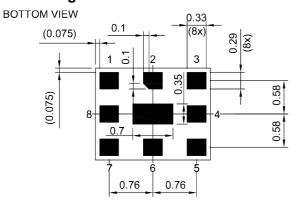


Figure 1: Picture of component with example of product marking.

SAW duplexer 733 / 788 MHz

Data sheet

3 Package



4 Pin configuration

1 RX

1 3 TX

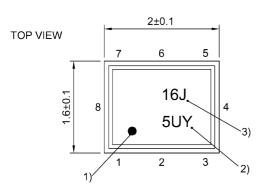
■ 6 ANT

2, 4, 5, 7, Ground 8

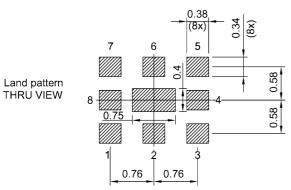
Pad and pitch tolerance ±0.05

SIDE VIEW





- 1) Marking for pad number 1
- 2) Example of encoded lot number
- 3) Example of encoded filter type number



Landing pad tolerance -0.02

Figure 2: Drawing of package with package height A = 0.45 mm (max.). See Sec. Package information (p. 21).



SAW components B4427
SAW duplexer 733 / 788 MHz

Data sheet

5 Matching circuit

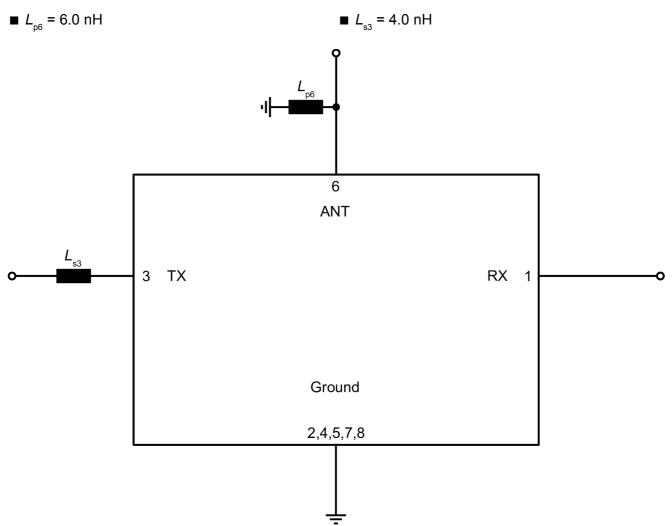


Figure 3: Schematic of matching circuit.



SAW duplexer 733 / 788 MHz

Data sheet

Characteristics

TX - ANT

Temperature range for specification = -30 °C ... +85 °C T_{SPEC} TX terminating impedance = 50 Ω with ser. 4.0 nH¹⁾ $Z_{\scriptscriptstyle{\mathsf{ANT}}}$ ANT terminating impedance = 50 Ω with par. 6.0 nH¹⁾

RX terminating impedance = 50 Ω

Characteristics TX – ANT				$\begin{array}{c} \text{min.} \\ \text{for } T_{\text{SPEC}} \end{array}$	typ. @ +25 °C	$\begin{array}{c} \text{max.} \\ \text{for } T_{\text{SPEC}} \end{array}$	
Center frequency			f _C	_	733		MHz
Maximum insertion attenuation			$\boldsymbol{\alpha}_{\text{max}}$				
	718 748	MHz		_	1.8	3.0	dB
	718 748	MHz		_	1.8	$3.5^{2)}$	dB
Amplitude ripple (p-p)			Δα				
	718 748	MHz		_	0.9	2.6	dB
Maximum VSWR			$VSWR_{max}$				
@ TX port	718 748	MHz		_	1.8	2.1	
@ ANT port	718 748	MHz		_	1.5	2.0	
Minimum attenuation			$\alpha_{_{min}}$				
	100 698	MHz		30	37	_	dB
	698 710	MHz		15	42	_	dB
	758 773	MHz		18	34	_	dB
	773 803	MHz		47	51	_	dB
	859 894	MHz		30	38	_	dB
	1225 1250	MHz		45	50	_	dB
	1436 1606	MHz		40	42	_	dB
	1710 2025	MHz		35	38	_	dB
	2154 2244	MHz		32	37	_	dB
	2400 2992	MHz		30	35	_	dB
	4900 5950	MHz		18	24	_	dB

See Sec. Matching circuit (p. 6). Valid for temperature $T = -40 \, ^{\circ}\text{C...} + 85 \, ^{\circ}\text{C.}$



SAW duplexer 733 / 788 MHz

Data sheet

6.2 ANT - RX

Temperature range for specification $T_{\rm SPEC} = -30~{\rm ^{\circ}C}~...~+85~{\rm ^{\circ}C}$ TX terminating impedance $Z_{\rm TX} = 50~\Omega$ with ser. 4.0 nH¹⁾ ANT terminating impedance $Z_{\rm ANT} = 50~\Omega$ with par. 6.0 nH¹⁾ RX terminating impedance $Z_{\rm RX} = 50~\Omega$

Characteristics ANT – RX				$\begin{array}{c} \text{min.} \\ \text{for } T_{\text{SPEC}} \end{array}$	typ. @ +25 °C	$\begin{array}{c} \text{max.} \\ \text{for } T_{\text{\tiny SPEC}} \end{array}$	
Center frequency			f _C	_	788	_	MHz
Maximum insertion attenuation			$\boldsymbol{\alpha}_{\text{max}}$				
	773 803	MHz		_	2.3	3.4	dB
	773 803	MHz		_	2.3	3.9 ²⁾	dB
Amplitude ripple (p-p)			Δα				
	773 803	MHz		_	0.8	2.0	dB
Maximum VSWR			$VSWR_{max}$				
@ ANT port	773 803	MHz		_	1.5	2.0	
@ RX port	773 803	MHz		_	1.9	2.2	
Minimum attenuation			$\boldsymbol{\alpha}_{\text{min}}$				
	100 718	MHz		50	63	_	dB
	718 748	MHz		50	64	_	dB
	820 830	MHz		26	43	_	dB
	830 4300	MHz		40	48	_	dB
	4300 6000	MHz		30	39	_	dB

¹⁾ See Sec. Matching circuit (p. 6).

Valid for temperature $T = -40 \,^{\circ}\text{C...} + 85 \,^{\circ}\text{C.}$



SAW duplexer 733 / 788 MHz

Data sheet

6.3 TX – RX

Temperature range for specification $T_{\text{SPEC}} = -30 \,^{\circ}\text{C} \dots +85 \,^{\circ}\text{C}$ TX terminating impedance $Z_{\text{TX}} = 50 \, \Omega$ with ser. 4.0 nH¹⁾

ANT terminating impedance $Z_{\text{ANT}} = 50 \, \Omega$ with par. 6.0 nH¹⁾

RX terminating impedance $Z_{RX} = 50 \Omega$

Characteristics TX – RX				$\begin{array}{c} \text{min.} \\ \text{for } T_{\text{SPEC}} \end{array}$	typ. @ +25 °C	$\begin{array}{c} \text{max.} \\ \text{for } T_{\text{\tiny SPEC}} \end{array}$	
Minimum isolation			$\alpha_{_{min}}$				
	718 748	MHz		60	63	_	dB
	773 803	MHz		54	60	_	dB

¹⁾ See Sec. Matching circuit (p. 6).



SAW components	B4427
SAW duplexer	733 / 788 MHz

Data sheet

Maximum ratings

Operable temperature	T _{OP} = −40 °C +85 °C	
Storage temperature	T _{STG} ¹⁾ = −40 °C +85 °C	
DC voltage	$ V_{DC} ^{2)} = 0 V$	
Input power @ TX port: 718 748 MHz	$P_{\text{IN}} = 29 \text{ dBm}$	Continuous wave for 5000 h @ 50 °C.

Not valid for packaging material. Storage temperature for packaging material is -25 °C to +40 °C. In case of applied DC voltage blocking capacitors are mandatory.



SAW duplexer 733 / 788 MHz

Data sheet

8 Transmission coefficients

8.1 TX - ANT 0.0 α/dB 1.0 1.740 2.0 .795 3.0 4.0 720 730 740 750 760 f/MHz 0.0 20.0 40.0 60.0 80.0 700 800 650 675 725 825 750 775 850 f/MHz 0.0 20.0 40.0 60.0 80.0 1000 2000 3000 4000 5000 6000 f/MHz-

Figure 4: Attenuation TX – ANT.



SAW components B4427
SAW duplexer 733 / 788 MHz

Data sheet

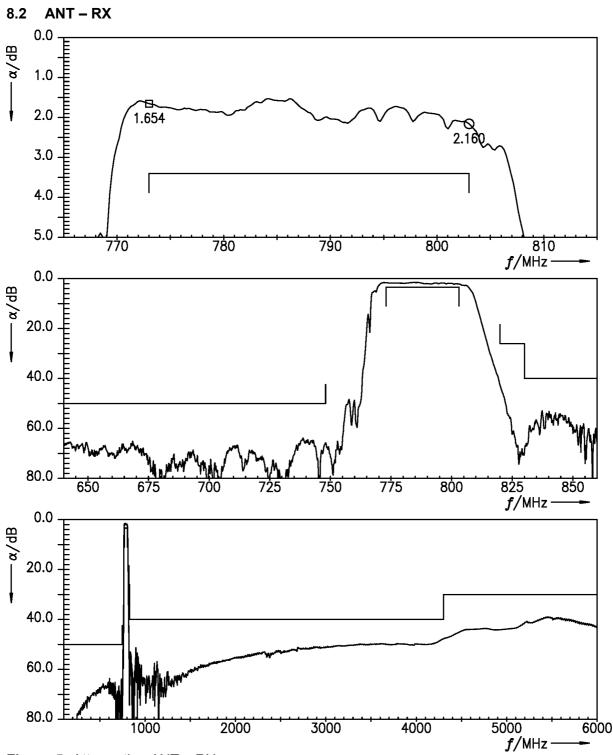


Figure 5: Attenuation ANT – RX.



SAW components B4427
SAW duplexer 733 / 788 MHz

Data sheet

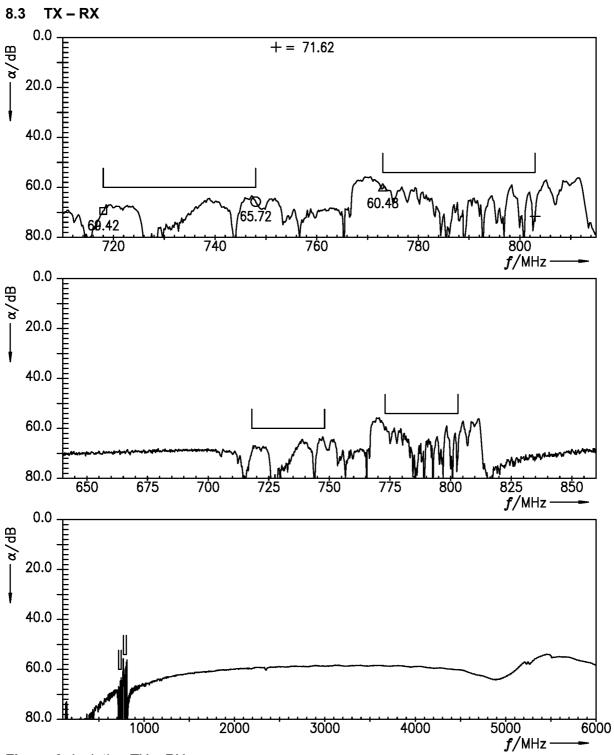


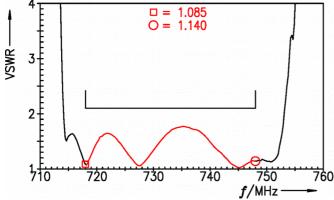
Figure 6: Isolation TX – RX.



SAW duplexer 733 / 788 MHz

Data sheet

9 Reflection coefficients



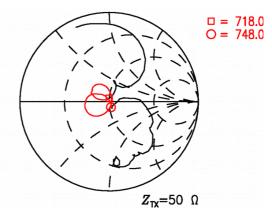
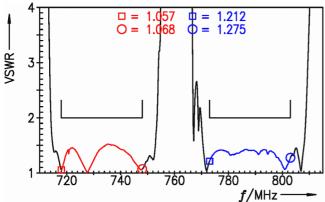


Figure 7: Reflection coefficient at TX port.



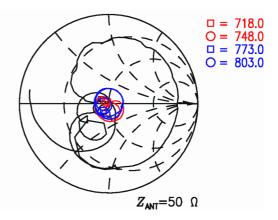
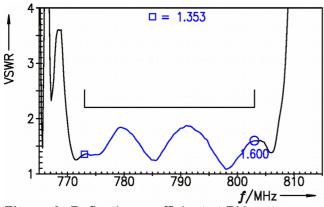


Figure 8: Reflection coefficient at ANT port.



 $\Box = 773.0$ O = 803.0 $Z_{RX} = 50 \Omega$

Figure 9: Reflection coefficient at RX port.

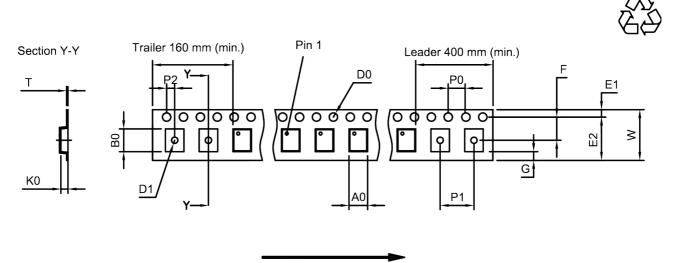


SAW duplexer 733 / 788 MHz

Data sheet

10 Packing material

10.1 Tape



User direction of unreeling

Figure 10: Drawing of tape (first-angle projection) with tape dimensions according to Table 1.

A ₀	1.8±0.05 mm	E ₂	6.25 mm (min.)	_	P_1	4.0 _{±0.1} mm
B_0	2.25±0.05 mm	F	3.5±0.05 mm		P_2	2.0±0.05 mm
D_0	1.5+0.1/-0 mm	G	0.75 mm (min.)		Т	0.25±0.03 mm
D ₁	1.0 mm (min.)	K_0	0.6±0.05 mm		W	8.0+0.3/-0.1 mm
E ₁	1.75 _{±0.1} mm	P_0	4.0±0.1 mm			

Table 1: Tape dimensions.



SAW duplexer 733 / 788 MHz

Data sheet

10.2 Reel with diameter of 180 mm

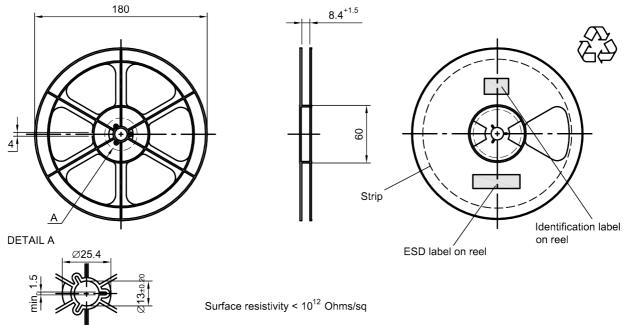


Figure 11: Drawing of reel (first-angle projection) with diameter of 180 mm.

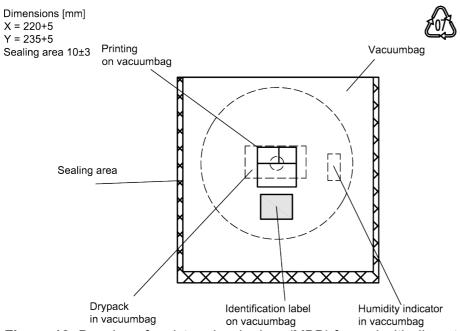


Figure 12: Drawing of moisture barrier bag (MBB) for reel with diameter of 180 mm.



SAW components B4427
SAW duplexer 733 / 788 MHz

Data sheet

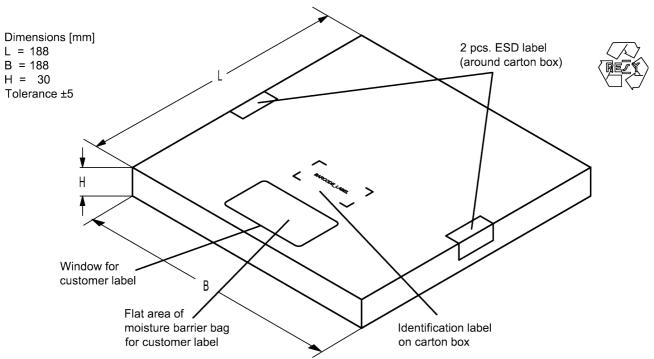


Figure 13: Drawing of folding box for reel with diameter of 180 mm.



SAW duplexer 733 / 788 MHz

Data sheet

11 Marking

Products are marked with product type number and lot number encoded according to Table 2:

■ Type number:

The 4 digit type number of the ordering code, e.g., B3xxxxB**1234**xxxx, is encoded by a special BASE32 code into a 3 digit marking.

Example of decoding type number marking on device in decimal code.

16J => 1234 1 x 32² + 6 x 32¹ + 18 (=J) x 32⁰ = 1234

The BASE32 code for product type B4427 is 4AB.

■ Lot number:

The last 5 digits of the lot number, e.g., are encoded based on a special BASE47 code into a 3 digit marking.

Example of decoding lot number marking on device in decimal code.

5UY => 12345 $5 \times 47^2 + 27 (=U) \times 47^1 + 31 (=Y) \times 47^0 =$ 12345

Adopted BASE32 code for type number					
Decimal	Base32	Decimal	Base32		
value	code	value	code		
0	0	16	G		
1	1	17	Н		
2	2	18	J		
3	3	19	K		
4	4	20	M		
5	5	21	N		
6	6	22	Р		
7	7	23	Q		
8	8	24	R		
9	9	25	S		
10	Α	26	Т		
11	В	27	V		
12	С	28	W		
13	D	29	X		
14	E	30	Y		
15	F	31	Z		

Adopted BASE47 code for lot number						
Decimal	Base47	Decimal	Base47			
value	code	value	code			
0	0	24	R			
1	1	25	S			
2	2	26	Т			
3	3	27	U			
4	4	28	V			
5	5	29	W			
6	6	30	Х			
7	7	31	Y			
8	8	32	Z			
9	9	33	b			
10	Α	34	d			
11	В	35	f			
12	С	36	h			
13	D	37	n			
14	Е	38	r			
15	F	39	t			
16	G	40	V			
17	Н	41	\			
18	J	42	?			
19	K	43	{			
20	L	44	}			
21	М	45	<			
22	N	46	>			
23	Р					

Table 2: Lists for encoding and decoding of marking.



SAW components	B4427
SAW duplexer	733 / 788 MHz

Data sheet

12 Soldering profile

The recommended soldering process is in accordance with IEC $60068-2-58-3^{rd}$ edit and IPC/JEDEC J-STD-020B.

ramp rate	≤ 3 K/s
preheat	125 °C to 220 °C, 150 s to 210 s, 0.4 K/s to 1.0 K/s
T > 220 °C	30 s to 70 s
T > 230 °C	min. 10 s
T > 245 °C	max. 20 s
<i>T</i> ≥ 255 °C	-
peak temperature T_{peak}	250 °C +0/-5 °C
wetting temperature T_{min}	230 °C +5/-0 °C for 10 s ± 1 s
cooling rate	≤ 3 K/s
soldering temperature T	measured at solder pads

Table 3: Characteristics of recommended soldering profile for lead-free solder (Sn95.5Ag3.8Cu0.7).

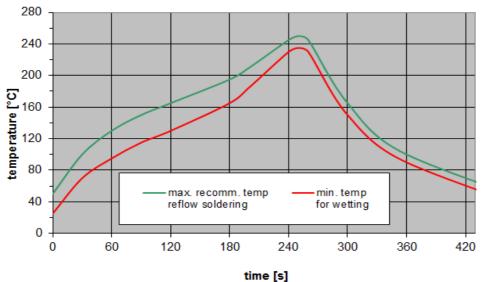


Figure 14: Recommended reflow profile for convection and infrared soldering – lead-free solder.



SAW duplexer 733 / 788 MHz

Data sheet

13 Annotations

13.1 Matching coils

See TDK inductor pdf-catalog http://www.tdk.co.jp/tefe02/coil.htm#aname1 and Data Library for circuit simulation http://www.tdk.co.jp/etvcl/index.htm.

13.2 RoHS compatibility

ROHS-compatible means that products are compatible with the requirements according to Art. 4 (substance restrictions) of Directive 2011/65/EU of the European Parliament and of the Council of June 8th, 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("Directive") with due regard to the application of exemptions as per Annex III of the Directive in certain cases.

13.3 Scattering parameters (S-parameters)

The pin/port assignment is available in the headers of the S-parameter files. Please contact your local RF360 sales office.



SAW duplexer 733 / 788 MHz

Data sheet

14 Cautions and warnings

14.1 Display of ordering codes for RF360 products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications and the website of RF360, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products. Detailed information can be found on the Internet under www.rf360jv.com/orderingcodes.

14.2 Material information

Due to technical requirements components may contain dangerous substances. For information on the type in question please also contact one of our sales offices.

For information on recycling of tapes and reels please contact one of our sales offices.

14.3 Moldability

Before using in overmolding environment, please contact your local RF360 sales office.

14.4 Package information

Landing area

The printed circuit board (PCB) land pattern (landing area) shown is based on RF360 internal development and empirical data and illustrated for example purposes, only. As customers' SMD assembly processes may have a plenty of variants and influence factors which are not under control or knowledge of RF360, additional careful process development on customer side is necessary and strongly recommended in order to achieve best soldering results tailored to the particular customer needs.

Dimensions

Unless otherwise specified all dimensions are understood using unit millimeter (mm).

Dimensions do not include burrs.

Projection method

Unless otherwise specified first-angle projection is applied.



Important notes

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