

APPLICATION NOTE

LF Driver ATA5279C with Channel Extension Using NMOS Antenna Multiplexer

ATA5279C

Description

Several automotive Passive Entry applications require more than the six LF antennas usually supported by the Atmel[®] ATA5279C LF driver. Figure 1 on page 2 shows how to expand the device to drive a greater number (9) of LF antennas. In this proposal, an NMOS antenna multiplexer is inserted between output A6P on the ATA5279C driver and the return line A6N. The multiplexer, which is configured by two dual NMOS transistor devices, is controlled directly by a microcontroller and switches the expanded antennas numbers 6 to 9.

Figure 1. Schematic of a Nine-fold Antenna Driver

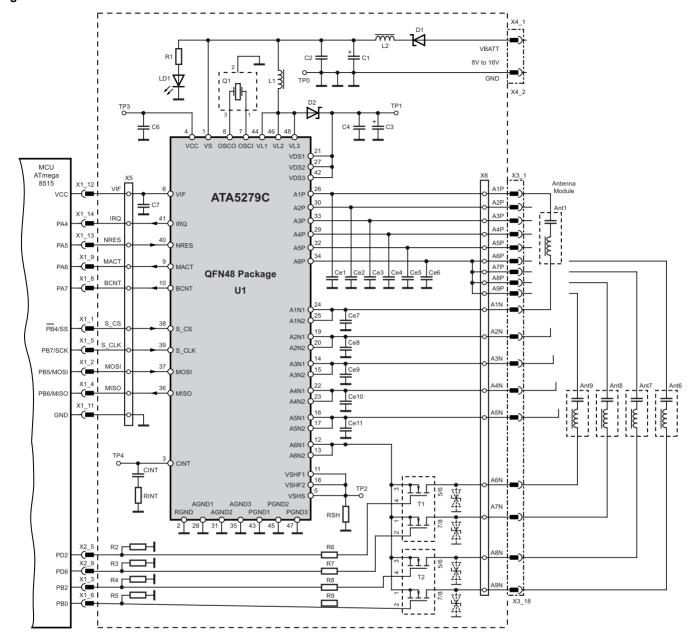


Table 1. Bill of Materials for Nine-fold LF Antenna Driver

iabic ii	Dill of Matorialo for Mills	mo rold Er Antonnia Briton			
Part No.	Designation	Value	Туре	Manufacturer	
U1	Transmitter IC		Atmel ATA5279C	Atmel [®]	
Q1	Ceramic Resonator	8MHz	CSTCE8M00G52A-R0	Murata [®]	
T1	Dual NMOS		BSO615NG	Infineon	
T2	Dual NMOS		BSO615NG	Infineon	
D1	Diode	Schottky 60V/2A	SS26	Vishay [®]	
D2	Diode	Schottky 60V/2A	SS26	Vishay	
LD1	LED	Red	TLMT 3100	Vishay	
R1	Resistor	1.8kΩ	SMD 0603	Standard	
R2 to R5	Resistor	100kΩ	SMD 0603	Standard	
R6 to R9	Resistor	0Ω	SMD 0603	Standard	
RSH	Resistor	$1.0\Omega/1W/\pm1\%$ tolerance	SMD 3520	Standard	
RINT	Resistor	0Ω	SMD 0603	Standard	
C1	Capacitor	Electrolytic 220pF/35V	EEUFM1V221	Panasonic [®]	
C2	Capacitor	Ceramic 100nF	SMD 0603	Standard	
C3	Capacitor	Ceramic 10µF/50V	GCM32EC71H106K	Murata	
C4	Capacitor	Ceramic 100nF	SMD 0603	Standard	
C6	Capacitor	Ceramic 100nF	SMD 0603	Standard	
C7	Capacitor	Ceramic 100nF	SMD 0603	Standard	
CINT	Capacitor	Ceramic 10nF	SMD 0603	Standard	
Ce1 to Ce11	Capacitor	Ceramic 1nF	SMD 0603	Standard	
L1	Inductor	68μH/2.45A/98mΩ	B82477P4683M00 Alternative 744 770 168	EPCOS/ Würth Elektronik	
L2	Inductor	68μH/2.45A/98mΩ	B82477P4683M00 Alternative 744 770 168	EPCOS/ Würth Elektronik	



1. Considerations when Using the Multiplex Proposal

For accurate antenna switching, the NMOS stages need to face the real part of the antenna impedance. Therefore, the antennas' LC tank must be matched to 125kHz ±5% resonant frequency.

With a 3V microcontroller supply, the gate control of the NMOS stages requires a level shifter to 5V or, better, 10V. This is necessary to secure sufficiently high V_{GS} voltage if there is a short-circuit current flowing into the return driver A6N (as this raises the source level of the NMOS).

The NMOS transistor stages must be logic-level types, which ensure the low R_{DSON} resistance needed to reach the required breaking current in a short circuit scenario. In addition, the gate capacitance has to be as small as possible to minimize the parasitic leakage current with 125kHz operation.

2. Conclusion

This proposal has been tested successfully on the Atmel ATAB5279 application board with the existing GUI software. All functions, including fault scenarios, work properly under laboratory conditions. Nevertheless, the target application needs to be checked for reliable operation over the entire temperature range.

3. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

Revision No.	History
9193D-RKE-12/15	Table 1 "Bill of Materials for Nine-fold LF Antenna Driver" on page 3 updated
9193C-RKE-04/15	Put document in the latest template













Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA T: (+1)(408) 441.0311

F: (+1)(408) 436.4200

www.atmel.com

© 2015 Atmel Corporation. / Rev.: 9193D-RKE-12/15

Atmel®, Atmel logo and combinations thereof, Enabling Unlimited Possibilities®, and others are registered trademarks or trademarks of Atmel Corporation in U.S. and other countries. Other terms and product names may be trademarks of others.

DISCLAIMER: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN THE ATMEL TERMS AND CONDITIONS OF SALES LOCATED ON THE ATMEL WEBSITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS AND PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and products descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

SAFETY-CRITICAL, MILITARY, AND AUTOMOTIVE APPLICATIONS DISCLAIMER: Atmel products are not designed for and will not be used in connection with any applications where the failure of such products would reasonably be expected to result in significant personal injury or death ("Safety-Critical Applications") without an Atmel officer's specific written consent. Safety-Critical Applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. Atmel products are not designed nor intended for use in military or aerospace applications or environments unless specifically designated by Atmel as military-grade. Atmel products are not designed nor intended for use in automotive applications unless specifically designated by Atmel as automotive-grade.