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.

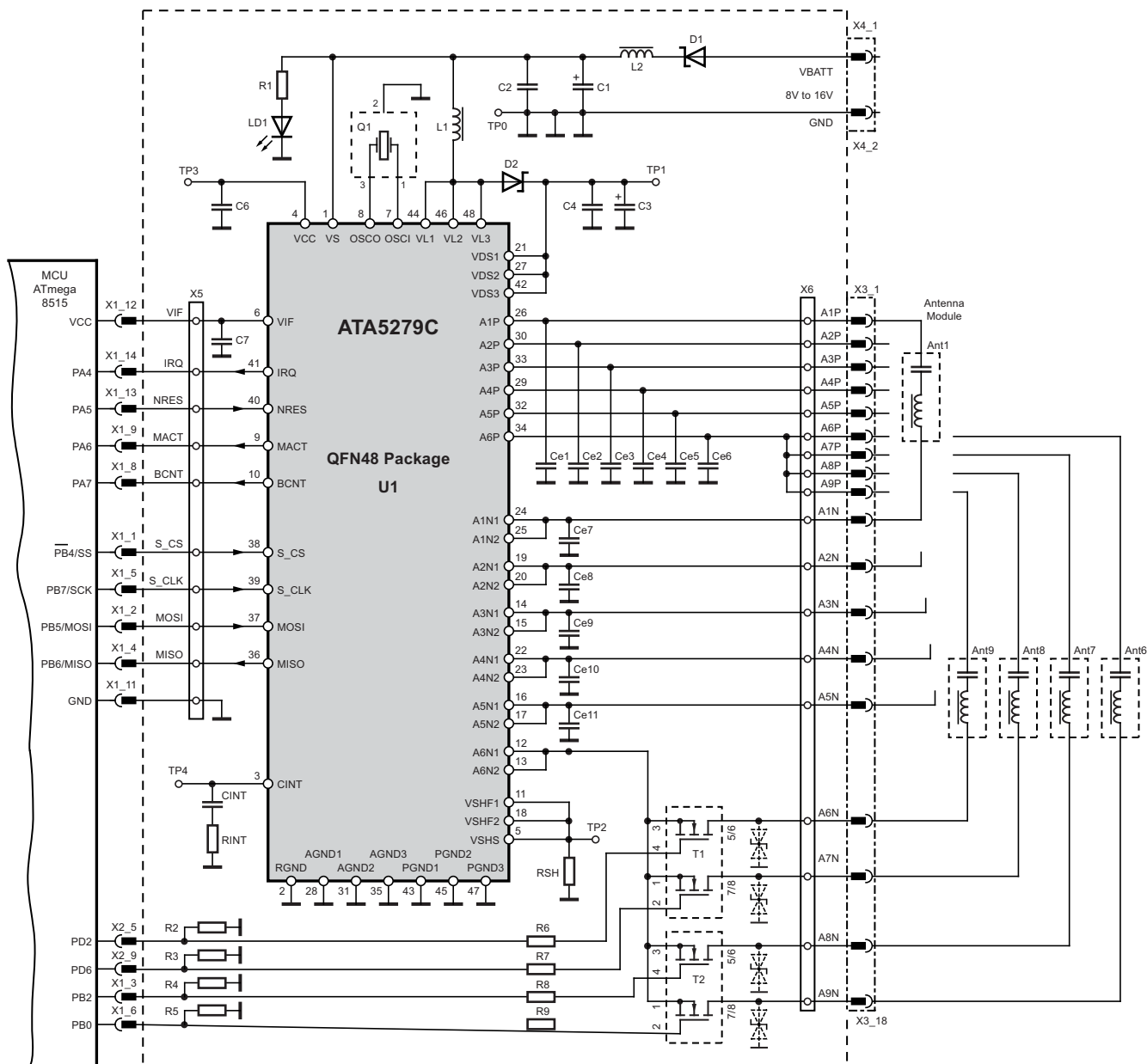**Figure 1.   Schematic of a Nine-fold Antenna Driver**

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

Part No.	Designation	Value	Type	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	1.0Ω/1W/ ±1% 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

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