Maximize Power Line Communication signal level on ST7590 PRIME compliant applications

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By Riccardo FIORELLI

Main components

| ST7590 | Narrow-band OFDM power line networking PRIME compliant system-on-chip |

Specification

- ST7590 Power supply voltage: VCC = 16.5 V +/- 5%
- ST7590 Power Amplifier output level: V(PA_OUT) = 16 V pk-pk = 2.25 V rms
- Compliance with output level limits for Power Line Communication devices set by EN50065-1 standard

Circuit description

This design note gives an alternative Power Amplifier configuration with respect to the existing ST7590 reference designs based on ST7590 and ST7590T, giving maximum performance in terms of transmitted Power Line Communication (PLC) signal level.

The purpose is maximizing the dynamic range, making the PLC node based on ST7590 capable of coping with higher attenuation, in field or during performance evaluation tests.

The main change is an increase in the Power Amplifier (PA) gain, exploiting a wider output range. This clearly impacts on VCC supply voltage minimum level: it shall allow reaching the desired PA output swing without increasing the signal distortion.

The suggested circuit can be applied to the existing ST7590 development kits by applying a few BOM changes and changing the VCC power supply source.
Measurement results

Test conditions

The following conditions have been applied to the ST7590 device to validate the circuit performance:

- ST7590 protocol configuration: PHY mode
- Subcarriers’ modulation = DBPSK with FEC (convolutional coding)
- Transmission frame duration = 29 ms
- Transmission period = 1 s

Test results

The circuit performance has been evaluated against the maximum output level and conducted emission level set by the European standard EN50065-1.

It can be noticed that the suggested solution gives an increase of 3.5 V pk-pk, i.e. about 2 dB, with respect to a circuit having a VCC level of 13 V and a Power Amplifier configuration as per reference designs based on ST7590 and ST7590T.
Figure 2. Output signal on PA_OUT pin vs. VCC supply level

Figure 3. Maximum output level measured according to EN50065-1
Figure 4. Conducted emissions – 9 to 150 kHz

Figure 5. Conducted emissions – 150 kHz to 30 MHz
Support material

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Documentation


Revision history

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