Transmitter Module for Cellular Phones
T0212AZ0836

The transmitter module integrating a CDMA Cellular band transmission circuit. With built-in FUJITSU’s band-pass filter and duplexers, it enables customers to reduce development man-hours. It also reduces the mounting area by 30% or more compared to structures with discrete parts.

Introduction

Largely classified, the transmitting circuit for CDMA Cellular band is composed of RF parts such as a band-pass filter, power amplifier (hereafter abbreviated as PA), and duplexer. FUJITSU has now developed a transmitter module integrating these discrete parts. This product contributes to a 30% reduction in the area occupied by the transmitting circuit for CDMA Cellular band as well as a reduction in development man-hours and number of mounting parts in the RF block.

Overview

Cellular phone market has continued to grow each year and is nearing more than 0.9 billion phones in 2006. As the market expands, cell phones have evolved and the shift from the second to third generation has already begun. Concurrently, the communication block has been developed to include multimode, multiband functions as well as many others such as camera and TV. As such, the area assigned to the RF block, which is the keystone to communication, has been reduced as phones are miniaturized and reduced in weight.

The electronic parts used in the RF block have thus been miniaturized and integrated with ever-fewer mounting parts. The movements to develop front-end modules are also diverse. The module development trend can be summarized as follows:

- Direct conversion development and IC integrated VCO.
- Modules of ASM+transmitting system or ASM+ receiving system

Photo 1 External View

* Transition of GSM system RF blocks
  - Antenna switch module (ASM)
Transition of CDMA system RF blocks
* Direct conversion development
* IC incorporation of VCO
* Duplexer+PA module

Module development for CDMA system has been restricted to just one part of cell phones; the matching circuit must be adjusted around the band-pass filter and PA. As such, it is generally constructed with discrete parts.

FUJITSU has developed T0212AZ0836 as a transmitter module integrating a transmitting circuit for CDMA system. Fig.1 shows the block diagram for the transmitter module. FUJITSU has also developed the world’s first SAW duplexer for cell phones and has led the industry in terms of the performance and miniaturization of SAW filters and VCO modules. By adopting our SAW duplexer and SAW filter and developing an original RF design technology to realize the best match with a PA on the module, we can reduce customer development man-hours. Furthermore, this product can reduce the required area by approximately 30% or more compared to configurations with discrete parts. It also realizes a reduction in the number of mounting parts.

Product Features
* Reduction of development man-hours due to the elimination of the need to match between PA and SAW duplexer, between PA and SAW filter
* Reduction of mounting area by approximately 30% or more compared to configurations with discrete parts
* Size (P/N for Cellular band: T0212AZ0836)
  8.0mm×5.0mm×1.4mm (Max.)
* Built-in FUJITSU SAW duplexer and SAW filter
* Single-piece product with resin mold

Application
This product is optimal for CDMA Cellular band with 800MHz band.

Specifications
Table 1 presents the major features of this product, Figs.2 to 11 the diagrams of major features, Fig.12 the recommended circuit diagram, and Fig.13 the external dimensions and pin assignments.

Future Development
The product developed this time is a transmitter module for CDMA Cellular band with 800MHz band—we plan to develop products for W-CDMA and CELL/PCS dual bands in the future.

NOTE
* Other company names and brand names are the trademarks or registered trademarks of their respective owners.

<table>
<thead>
<tr>
<th>Table 1 Major Features (P/N: T0212AZ0836)</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
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<tbody>
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<td>Tx Mode</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>12</td>
<td>15</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>Pout=25dBm</td>
<td>22</td>
<td>25</td>
<td>—</td>
<td>dB</td>
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<tr>
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<td>13</td>
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<tr>
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<td>24</td>
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<tr>
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<td>—50</td>
<td>—48</td>
<td>dBC</td>
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<tr>
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<td>—60</td>
<td>—58</td>
<td>dBC</td>
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</tr>
<tr>
<td>Rx Output Port VSWR</td>
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<td>2.5</td>
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Figure 2 Major Features Diagram ①

Pout vs Icc @Vcc=3.4V, f=836.5MHz

Figure 3 Major Features Diagram ②

Pout vs Gain @Vcc=3.4V, f=836.5MHz

Figure 4 Major Features Diagram ③

Pout vs PAE @Vcc=3.4V, f=836.5MHz

Figure 5 Major Features Diagram ④

Pout vs VDET @Vcc=3.4V, f=836.5MHz

Figure 6 Major Features Diagram ⑤

Pout vs ACPR @Vcc=3.4V, f=836.5MHz

Figure 7 Major Features Diagram ⑥

Tx→Rx Isolation @Pout=25dBm
Figure 12 Recommended Circuit Diagram

Figure 13 External Dimensions/Pin Assignments