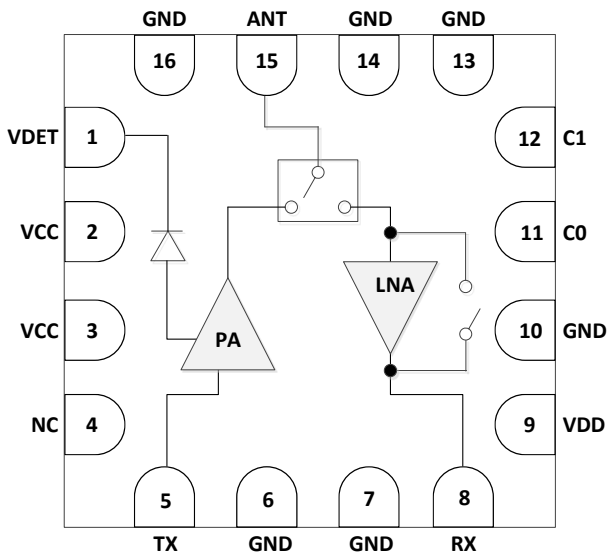


2.4GHz WLAN 802.11ax Front-End Module



Description

KCT8239SD is a fully integrated 802.11b/g/n/ac/ax WLAN RF Front-end module (FEM) which incorporates key RF functionality. It is integrated with a high-efficiency power amplifier (PA), a low noise amplifier (LNA) with bypass, the associated matching network and a single-pole, double-throw (SPDT) switch all in one device.

KCT8239SD integrates a DC voltage output power detector, and a digital enable control for transmitter power ramp on/off control.

KCT8239SD is assembled in a compact, low-profile 3x3x0.75mm 16-pin QFN package. It is the perfect RF Front-end solution for implementing 2.4GHz high performance WLAN systems supporting multiple standards.

Applications

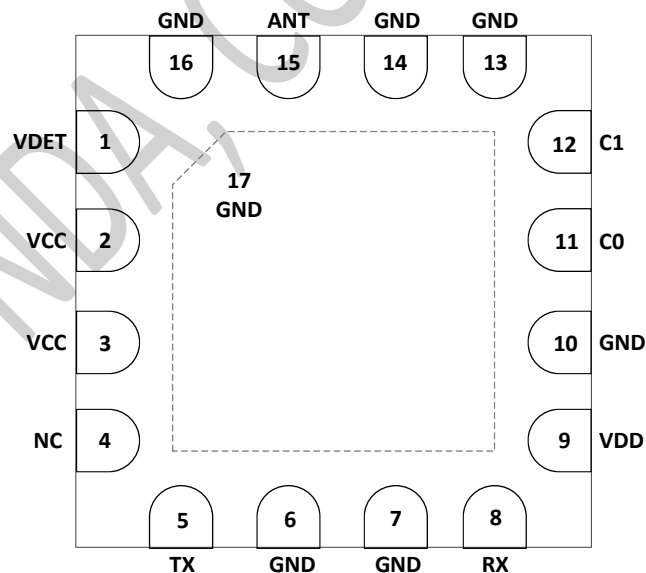
- ▶ 802.11ax Wi-Fi Devices
- ▶ Tablets / MIDs
- ▶ Wi-Fi Media Gateways
- ▶ Consumer Electronics
- ▶ Notebook / Netbook / Ultrabook
- ▶ Access Points / Routers
- ▶ Set Top Boxes / Wireless IPTVs
- ▶ Internet of Things

FEATURES

- ▶ Integrated high performance 2.4GHz PA, LNA with bypass, and T/R switch
- ▶ Fully-matched input and output
- ▶ Integrated Power Detector
- ▶ Transmit gain: 30.0dB at 5V
- ▶ Receive gain: 15.5dB at 5V
- ▶ Noise figure: 2.5dB at 5V
- ▶ Output power: +20.5dBm @ -43dB DEVM, HE40/MCS11,5V
- ▶ +21.5dBm @ -40dB DEVM, HE40/MCS11,5V
- ▶ +23.5dBm @ -35dB DEVM, VHT40/MCS9,5V
- ▶ +24.5dBm @ -30dB DEVM, HT20/MCS7,5V
- ▶ ESD protection circuitry on all PINs
- ▶ Minimal External Components Required
- ▶ Small package: QFN-16L, 3mm x 3mm x 0.75mm (MSL3, 260 °C per JEDEC J-STD-020)
- ▶ RoHS and REACH Compliant

PIN ASSIGNMENTS

| Pin Number | Pin Name | Description |
|--------------------|----------|--|
| 1 | VDET | DC power detector |
| 2,3 | VCC | PA Supply Voltage |
| 4 | NC | Internally not connected |
| 5 | TX | RF input port from the transceiver - DC shorted to GND |
| 6,7,10,13,14,16,17 | GND | Ground – must be connected to ground in the application circuit |
| 8 | RX | RF output port from the LNA or Bypass |
| 9 | VDD | LNA Supply Voltage |
| 11 | C0 | Control Pin 0 |
| 12 | C1 | Control Pin 1 |
| 15 | ANT | Antenna port – RF signal from the PA or RF signal applied to the LNA |

PIN-OUT DIAGRAM (Top View)


ABSOLUTE MAXIMUM RATINGS

| Parameters | Units | Min | Max | Conditions |
|---------------------|-------|-----|------|------------------|
| DC Supply Voltage | V | 0 | +6.0 | VDD and VCC Pins |
| Control Voltage | V | 0 | +3.6 | All Control Pins |
| Storage Temperature | °C | -40 | +150 | |

NOTE: Sustained operation at or above the Absolute Maximum Ratings for any one or combinations of the above parameters may result in permanent damage to the device and is not recommended.

All Maximum RF Input Power Ratings assume 50-ohm terminal impedance.

NOMINAL OPERATING CONDITIONS

| Parameters | Units | Min | Typical | Max | Conditions |
|------------------------------------|-------|------|------------|------|-------------------------------------|
| DC Supply Voltage | V | 4.75 | 5.0 | 5.25 | VDD and VCC Pins |
| Control Pin Voltage- Logic High | V | 1.6 | | 3.6 | |
| Control Pin Voltage- Logic Low | V | 0 | | 0.4 | |
| Control Pin DC Current C0 C1 | µA | | 250 250 | | @3.3V |
| Operating Temperature | °C | -20 | +25 | +65 | |
| Extended Operating Temperature | °C | -40 | +25 | +85 | Functional with reduced performance |

KCT8239SD ELECTRICAL SPECIFICATIONS

(VCC = VDD = 5.0V, T = 25°C, All Unused Ports Terminated with 50Ω, Unless Otherwise Noted)

| Parameters | Units | Min | Typ | Max | Conditions |
|----------------------|-------|-----|--------------------------------------|-----|---|
| Frequency Range | GHz | 2.4 | | 2.5 | |
| Transmit Mode | | | | | |
| Gain | dB | | 30.0 | | |
| Output Power | dBm | | 20.5 21.5 23.5 24.5 28.0 | | With -50dB EVM source, AT off: DEVM=-43dB, HE40/MCS11/200µs, Preamble only DEVM=-40dB, HE40/MCS11/200µs, Preamble only DEVM=-35dB, VHT40/MCS9/200µs, Preamble only DEVM=-30dB, HT20/MCS7/200µs, Preamble only 802.11b, Mask Compliance |
| Output power of P1dB | dBm | | 30 | | |
| Current | mA | | 140 240 300 460 | | 100% duty modulated signal @ No RF @+20.5dBm @+23.5dBm @+28.0dBm |

| Parameters | Units | Min | Typ | Max | Conditions |
|---|---------|-----|--------------------------------------|-----|---|
| Harmonics 2 nd Harmonics 3 rd Harmonics | dBm/MHz | | -20 -45 | | Pout=+28dBm, 802.11b |
| Input Return Loss | dB | | 7 | | |
| Output Return Loss | dB | | 12 | | |
| Power Detector Output | V | | 0.06 0.29 0.58 0.65 0.77 | | 100% duty modulated signal @ No RF @+10.0dBm @+20.5dBm @+23.5dBm @+28.0dBm |
| Detector Slope | mV/dB | | 27 | | From +10dBm to +28Bm |
| Isolation | dB | | 38 20 | | From ANT to RX Pin From TX to RX Pin |
| Receive Mode – LNA On | | | | | |
| Gain | dB | | 15.5 | | |
| Noise Figure | dB | | 2.5 | | |
| Input power of P1dB | dB | | -7 | | |
| Input Return Loss | dB | | 12 | | |
| Output Return Loss | dB | | 9 | | |
| Isolation | dB | | 21 36 | | From ANT to TX Pin From RX to TX Pin |
| LNA Current | mA | | 39 | | |
| Receive Bypass Mode | | | | | |
| Insertion Loss | dB | | 6 | | |
| Input Return Loss | dB | | 15 | | |
| Output Return Loss | dB | | 15 | | |
| Input power of P1dB | dB | | 21 | | |
| Isolation | dB | | 42 37 | | From ANT to TX Pin From RX to TX Pin |
| Bypass Current | mA | | 0.8 | | |

CONTROL LOGIC TABLE

| C0 | C1 | Mode of Operation |
|-----------|-----------|--------------------------|
| 0 | 1 | Transmit Mode |
| 1 | 0 | Receive LNA Mode |
| 1 | 1 | Receive Bypass Mode |
| 0 | 0 | Shutdown Mode |

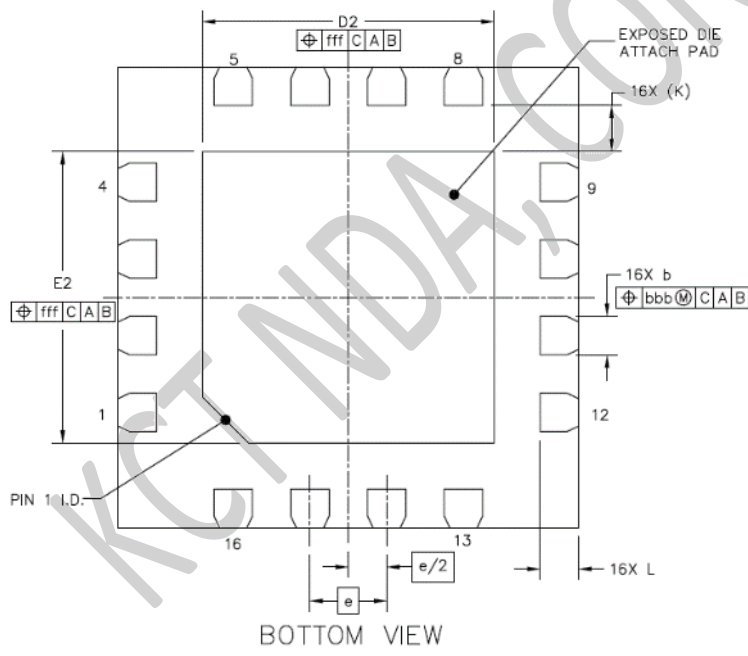
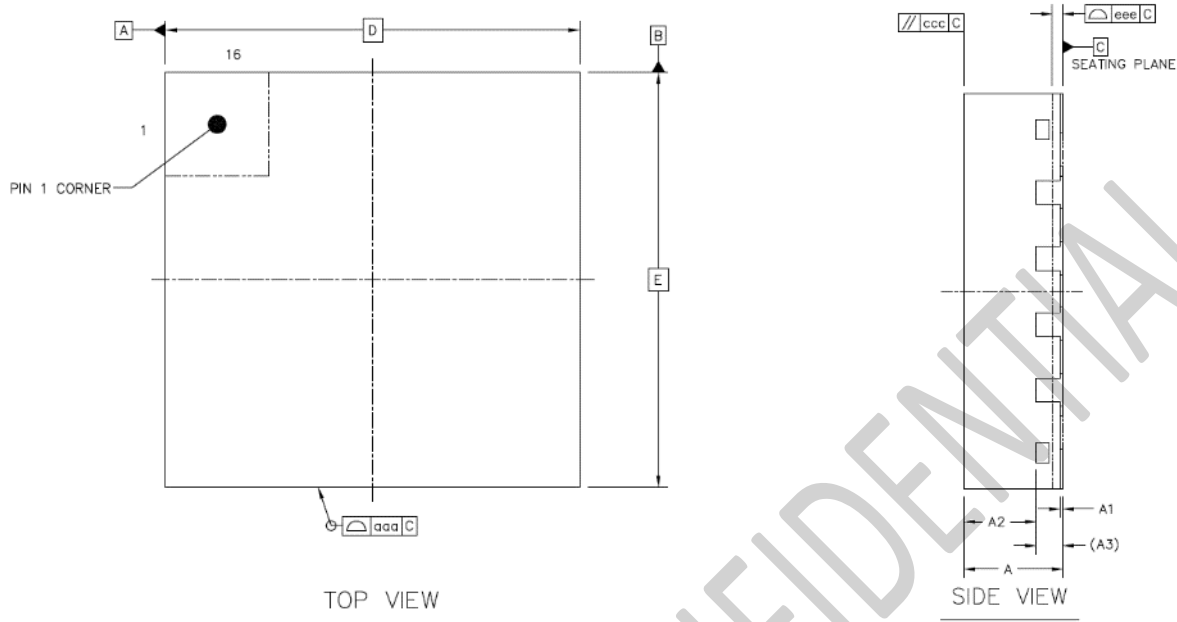
Note "1" denotes high voltage state Control Pins
"0" denotes low voltage state Control Pins

ORDERING INFORMATION

| Product Description | Product Part Number | Package Type | Package Quantity |
|---|----------------------------|---------------------|-------------------------|
| KCT8239SD: 2.4GHz WLAN Front-End Module | KCT8239SD | 13" tape and reel | 5000pcs / reel |

KCT NDA, CONFIDENTIAL

Package Dimensions (All dimensions are in millimeters)



| | SYMBOL | MIN | NOM | MAX | |
|------------------------------|--------|-----------|------|------|---|
| TOTAL THICKNESS | A | 0.7 | 0.75 | 0.8 | |
| STAND OFF | A1 | 0 | 0.02 | 0.05 | |
| MOLD THICKNESS | A2 | --- | 0.55 | --- | |
| L/F THICKNESS | A3 | 0.203 REF | | | |
| LEAD WIDTH | b | 0.2 | 0.25 | 0.3 | |
| BODY SIZE | X | 3 BSC | | | |
| | Y | 3 BSC | | | |
| LEAD PITCH | e | 0.5 BSC | | | |
| EP SIZE | X | D2 | 1.8 | 1.9 | 2 |
| | Y | E2 | 1.8 | 1.9 | 2 |
| LEAD LENGTH | L | 0.15 | 0.25 | 0.35 | |
| LEAD TIP TO EXPOSED PAD EDGE | K | 0.3 REF | | | |
| PACKAGE EDGE TOLERANCE | aaa | 0.1 | | | |
| MOLD FLATNESS | ccc | 0.1 | | | |
| COPLANARITY | eee | 0.08 | | | |
| LEAD OFFSET | bbb | 0.1 | | | |
| EXPOSED PAD OFFSET | fff | 0.1 | | | |