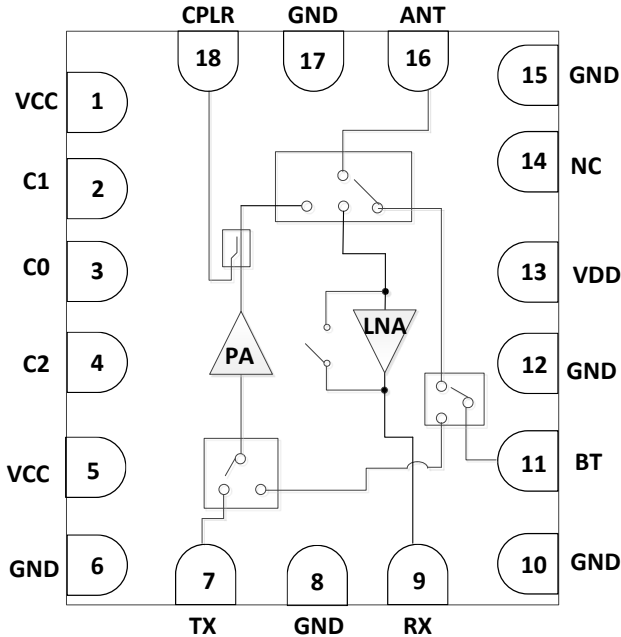


2.4GHz WLAN 802.11ax Front-End Module



Description

KCT8255HE is a highly integrated RF front-end IC incorporates key RF functionality needed for IEEE 802.11b/g/n/ac/ax WLAN systems operating in 2.4-2.5GHz range. It integrates a high-efficiency, high-linearity power amplifier (PA), a low noise amplifier (LNA) with bypass, the associated matching network, and harmonic filters all in one device.

KCT8255HE operates at a nominal voltage of 3.85V and supports two RF transmit modes: High-power mode, Low-power Mode. KCT8255HE also supports BT High-power and BT Bypass modes. A directional RF coupler are integrated to support closed-loop power control within the system. This system architecture supports portable devices such as cell phones and tablets.

KCT8255HE is assembled in a compact, low-profile 2x2.4x0.65mm 18-pin MIS package. It is the perfect RF Front-end solution for implementing 2.4GHz high performance WLAN systems supporting multiple standards.

Applications

- ▶ IEEE 802.11ax WLAN Devices
- ▶ Tablets / Smart Phones
- ▶ Dual-band WLAN Systems
- ▶ Chip-on-board (COB) Applications
- ▶ Other Portable Battery-Powered Electronic Devices

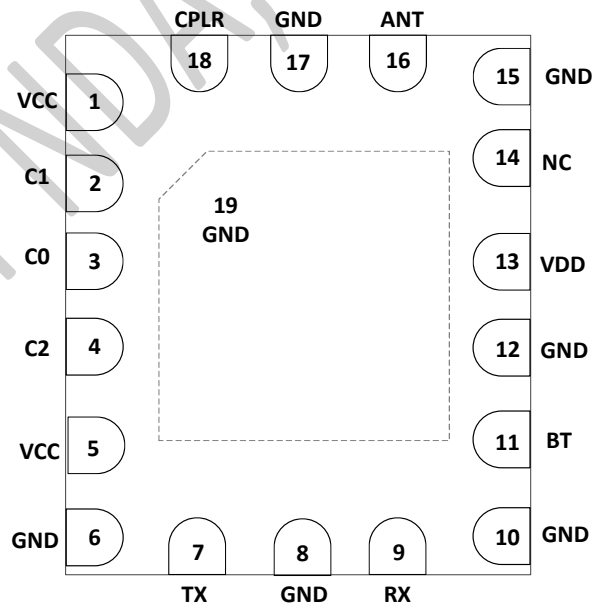
FEATURES

- ▶ Integrated high performance 2.4GHz 802.11ax FEM
- ▶ Fully-matched input and output
- ▶ Integrated RF power detector
- ▶ Transmit gain: 29.0dB at high-power mode, 3.85V
13.0dB at low-power mode, 3.85V
- ▶ Receive gain: 16.5dB at 3.85V
- ▶ Noise Figure: 2.2dB at 3.85V
- ▶ High-power mode output power: +14.5dBm @ -47dB DEVM, HE40/MCS11, 3.85V
+17.5dBm @ -43dB DEVM, HE40/MCS11, 3.85V
+21.5dBm @ -35dB DEVM, VHT40/MCS9, 3.85V
+22.5dBm @ -30dB DEVM, HT20/MCS7, 3.85V
- ▶ Low-power mode output power: +6.0dBm @ -45dB DEVM, HE40/MCS11, 3.85V
+7.0dBm @ -43dB DEVM, HE40/MCS11, 3.85V
- ▶ ESD protection circuitry on all PINs
- ▶ Minimal external components required
- ▶ Small package: MIS-18L, 2mm x 2.4mm x 0.65mm (MSL3, 260 °C per JEDEC J-STD-020)
- ▶ RoHS and REACH Compliant

PIN ASSIGNMENTS

Pin Number	Pin Name	Description
1,5	VCC	PA Supply Voltage
2	C1	Control Pin 1
3	C0	Control Pin 0
4	C2	Control pin 2
7	TX	RF input port from the transceiver – DC shorted to GND
9	RX	RF output port from the LNA or Bypass
11	BT	RF Input Port from the Bluetooth
13	VDD	LNA Supply Voltage
14	NC	Internally not connected
16	ANT	Antenna port – RF signal from the PA or RF signal applied to the LNA
18	CPLR	RF power detector
6,8,10,12,15,17,19	GND	Ground – must be connected to ground in the application circuit

PIN-OUT DIAGRAM (Top View)



ABSOLUTE MAXIMUM RATINGS

Parameters	Units	Min	Max	Conditions
DC Supply Voltage	V	0	+6.0	All VCC and VDD Pins
DC Input on Control pins	V	0	+4.2	All Control Pins
Storage Temperature	°C	-40	+125	

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	3.0	3.85	4.8	All VCC and VDD Pins
Control Pin Voltage "High"	V	1.0	1.8	3.6	All Control Pins
Control Pin Voltage "Low"	V	0		0.4	All Control Pins
Control Pin DC Current C0 C1 C2	uA		16 16 16		@1.6V
Operating Temperature	°C	-20	+25	+85	

KCT8255HE ELECTRICAL SPECIFICATIONS

(VCC = 3.85V, 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		29.0 13.0		High-power Mode Low-power Mode
TX Gain Flatness	dB		±0.25 ±0.50		Over any 20MHz bandwidth Over any 40MHz bandwidth
TX out of band gain-high power	dB		-10.5		700-900MHz
			4.0		1100-1230MHz
			29.0		1425-2200MHz
			29.0		2300-2370MHz
			16.0		3200-3950MHz
			3.0		3950-4400MHz
			-10.0		4400-4800MHz
			-13.0		4800-7700MHz

Parameters	Units	Min	Typ	Max	Conditions
			-38.5		7700-8100MHz
			-43.0		8100-10500MHz
			-36.0		10500-17000MHz
Output Power	dBm		14.5 17.5 21.5 22.5 26.0		With -50dB EVM source, AT off: High-power Mode DEVM=-47dB, HE40/MCS11/200μs, Preamble only DEVM=-43dB, HE40/MCS11/200μs, Preamble only DEVM=-35dB, VHT40/MCS9/200μs, Preamble only DEVM=-30dB, HT20/MCS7/200μs, Preamble only 802.11b, Mask Compliance
			6 7		With -50dB EVM source, AT off: Low-power Mode DEVM=-45dB, HE40/MCS11/200μs, Preamble only DEVM=-43dB, HE40/MCS11/200μs, Preamble only
Output power of P1dB	dBm		29		High-power Mode
Current	mA		150 180 265 395		High-power Mode 100% duty modulated signal @ No RF @ +14.5dBm @ +21.5dBm @ +26.0dBm
			50 55 60		Low-power Mode 100% duty modulated signal @ No RF @ +6dBm @ +9dBm
Harmonics 2 nd Harmonics 3 rd Harmonics	dBm/MHz		-18 -50		Pout=+23dBm, 802.11b
Input Return Loss	dB		9.0		High-power Mode
			15.0		Low-power Mode
Output Return Loss	dB		7.5		High-power Mode
			5.0		Low-power Mode
Coupling Factor	dB		20.5		High-power Mode
Coupling Ripple	dB		±0.5		
Coupling Directivity	dB		13.5		
PA Switching Time	ns		400		From 50% logic level change to 90%/10% power level TX <-> SD
Isolation	dB		48		From ANT to BT Pin
			48		From ANT to RX Pin
Receive Mode – LNA On					
Gain	dB		16.5		
Gain Flatness	dB		±0.1 ±0.2		Over any 20MHz bandwidth Over any 40MHz bandwidth

Parameters	Units	Min	Typ	Max	Conditions
RX out of band gain	dB		1.0		700-900MHz
			6.5		1100-1230MHz
			17.0		1425-2200MHz
			17.5		2300-2370MHz
			11.5		3200-3950MHz
			5.5		3950-4400MHz
			2.0		4400-4800MHz
			-1.5		4800-7700MHz
			-29.0		7700-8100MHz
			-31.5		8100-10500MHz
		-42.0		10500-17000MHz	
Noise Figure	dB		2.2		
Input power of P1dB	dBm		-7		
IIP3	dB		-1.5		
Input Return Loss	dB		12		
Output Return Loss	dB		8		
LNA Current	mA		29		
Switching Time	ns		360 450		From 50% logic level change to 90%/10% power level LNA <-> Bypass LNA <-> TX
Receive Bypass Mode					
Insertion Loss	dB		4		
Input Power of P1dB	dBm		20		
IIP3	dB		35		
Input Return Loss	dB		8		
Output Return Loss	dB		10		
LNA Bypass Current	uA		9		
Bluetooth High-power Mode					
Gain	dB		22		
Input Power of P1dB	dBm		-2.5		
Adjacent channel power	dBm		-46		±2 MHz offset, GFSK at Pout = 20.5dBm
Adjacent channel power	dBm		-52		±3 MHz offset, GFSK at Pout = 20.5dBm
Adjacent channel power	dBm		-25		±2 MHz offset, Pi/4-DPQSK, 8DPSK at Pout =19.8dBm
Adjacent channel power	dBm		-43		±3 MHz offset, Pi/4-DPQSK, 8DPSK at Pout =18.4dBm
Peak DEVM	%		7		Pi/4-DPQSK at Pout = 18dBm

Parameters	Units	Min	Typ	Max	Conditions
RMS DEVM	%		3		Pi/4-DPQSK at Pout = 18dBm
Current	mA		50 100 130		High-power Mode 100% duty modulated signal @ No RF @+16.5dBm @+18.5dBm
BT Input Return loss	dB		5		ANT port to BT port
BT Output Return loss	dB		6		
BT Isolation	dB		43		From ANT to BT Pin
Switching Time	ns		500 350		From 10%~90% power change of rising or falling edge BT <->RX BT <->TX
Bluetooth Bypass Mode					
Gain	dB		3		
BT Bypass Input Return loss	dB		11		
BT Bypass Output Return loss	dB		7		
Input Power of P1dB	dBm		24		
BT Bypass Current	uA		12		

CONTROL LOGIC TABLE

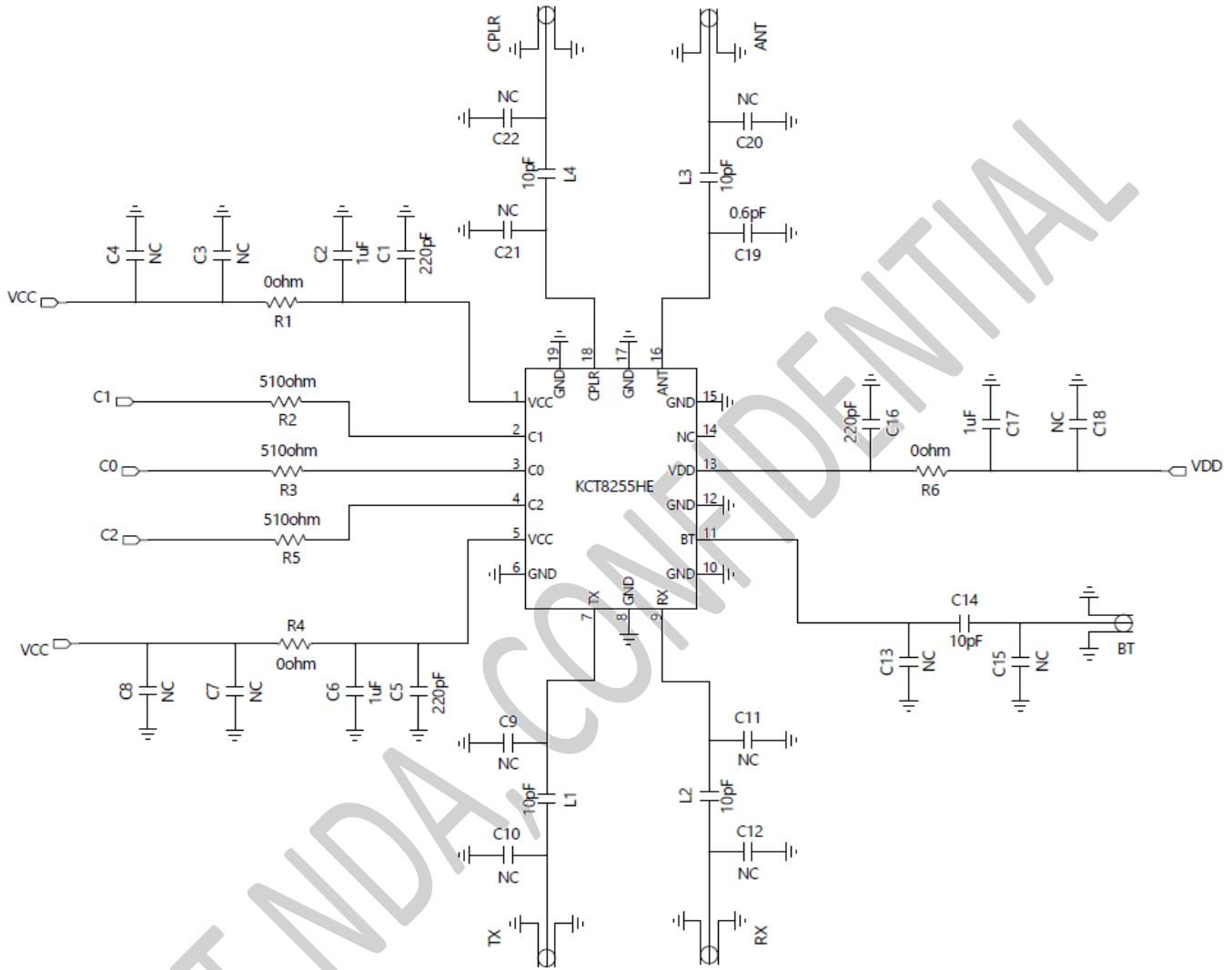
C0	C1	C2	Mode of Operation
1	0	0	Transmit, High-power Mode
1	1	1	Transmit, Low-power Mode
0	1	0	Receive LNA Mode
0	0	0	Receive Bypass Mode
0	1	1	BT High Power Mode
0	0	1	BT Bypass Mode

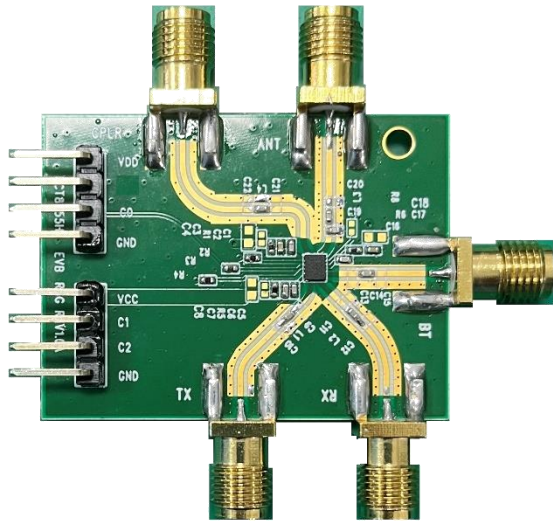
Note: "1" denotes high voltage state at Control Pins
"0" denotes low voltage state at Control Pins

ORDERING INFORMATION

Product Description	Product Part Number	Package Type	Package Quantity
KCT8255HE: 2.4GHz WLAN Front-End Module	KCT8255HE	7" tape and reel	3000pcs / reel

APPLICATION SCHEMATIC

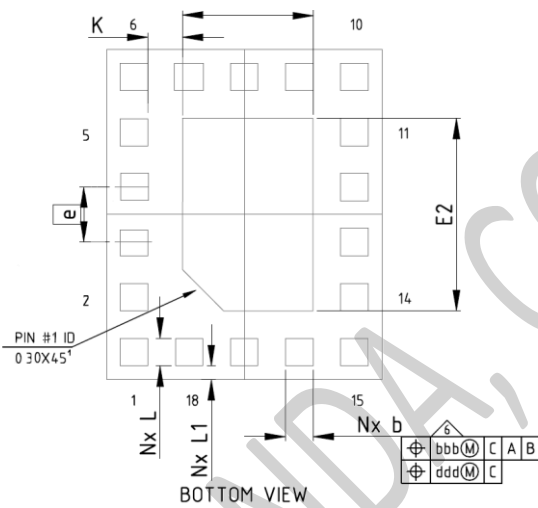
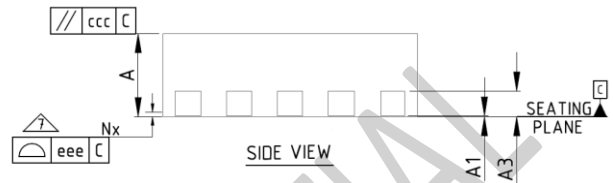
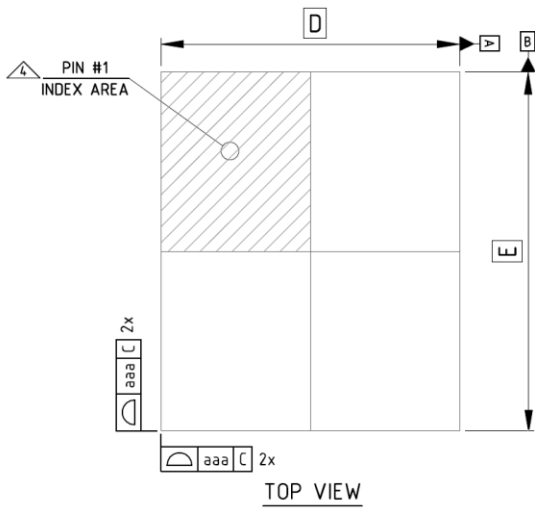


EVB PICTURE and EVB BOM


[EVB Assembly]

Designator	Value	Footprint	Notes
C19	0.6PF	0402	Murata C0G series
L1,L2,L3,L4,C14	10PF	0402	Murata C0G series
C1,C5,C16	220PF	0402	Murata X5R/X7R series
C2,C6,C17	1 μ F	0402	Murata X5R/X7R series
R1,R4,R6	0 ohm	0402	Yageo RC0402 series
R2,R3,R5	510 ohm	0402	Yageo RC0402 series Control pin protect resistor

PACKAGE DIMENSIONS (All dimensions are in millimeters)



Dimension Table			
Thickness	0.65		
Symbol	MINIMUM	NOMINAL	MAXIMUM
A	0.60	0.65	0.70
A1	-0.01	---	0.05
A3	---	0.200Ref	---
b	0.15	0.20	0.25
D	2.00BSC		
E	2.40BSC		
e	0.40BCS		
D2	0.85	0.95	1.05
E2	1.30	1.40	1.50
K	---	0.20Ref	---
L	0.15	0.20	0.25
L1	0.05	0.10	0.15
aaa	0.05		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.08		