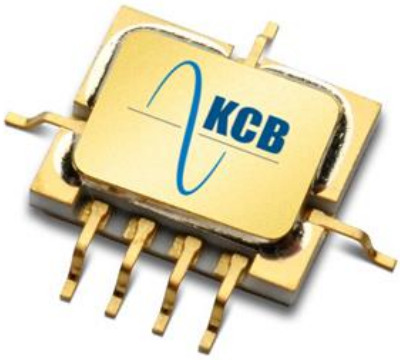
KS205

Switch, SPDT
0.02–6.0 GHz

KCB SOLUTIONS
THE HIGHEST STANDARD IN RF

DESCRIPTION

KS205 is a GaAs pHEMT Non-Reflective high performance, low loss switch in a 7-lead Hermetic Surface-Mount Technology (SMT) package for Harsh Environments including Defense and Satellite application. This device can be ordered with the 100% screening requirements of MIL-PRF-38535 Class B and S, in addition to the required QCI.



FEATURES

- ✓ Low Insertion Loss: 0.8 dB @ 2 GHz.
- ✓ High Isolation: 55 dB @ 2 GHz.
- ✓ Non-Reflective Match in off state (S22).
- ✓ NASA EEE-INST-002 compliant.
- ✓ Successfully Tested to 1MRAD TID.
- ✓ High Reliability Class B and S Screening Available.
- ✓ See Page 5 for MR HI –REL Ordering Details.

APPLICATIONS

- ✓ Microwave Radios
- ✓ Military Radios
- ✓ VSAT
- ✓ Telecom Infrastructure
- ✓ Test Equipment

TABLE I: ELECTRICAL CHARACTERISTICS (+25˚C)[1]

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Insertion Loss	IL	0.02 – 2.0 GHz		0.75	1.10	dB
		2.0 – 3.0 GHz		0.8	1.25	dB
		3.0 – 4.0 GHz		1.0	1.35	dB
		4.0 – 6.0 GHz		1.5	1.8	dB
Isolation	ISO	0.02 – 2.0 GHz	50	55		dB
		2.0 – 3.0 GHz	50	55		dB
		3.0 – 4.0 GHz	40	50		dB
		4.0 – 6.0 GHz	35	45		dB
RF1/RF2 Return Loss (ON State)	|S11|/ |S22|	0.02 – 2.0 GHz	19	22		dB
		2.0 – 3.0 GHz	15	22		dB
		3.0 – 4.0 GHz	12	18		dB
		4.0 – 6.0 GHz	9	12		dB
RF1/RF2 Return Loss (OFF State)	|S22|	0.02 – 0.1 GHz	0	4		dB
		0.1 – 0.5 GHz	5	8		dB
		0.5 – 2.0 GHz	9	11		dB
		2.0 – 4.0 GHz	12	15		dB
		4.0 – 6.0 GHz	9	13		dB

1. All electrical characteristics are measured at +25˚C at a minimum.

TABLE 2: OPERATING CHARACTERISTICS (-40 TO +85˚C, V_{CTL} = 0V/5V)[1]

Parameter	Symbol	Conditions	Min	Typical	Max	Units
Input Compression Point	IP1dB	0.5 – 6.0 GHz		+30		dBm
3rd order input intercept point (+8 dBm tones, 1 MHz spacing)	IIP3	0.5 – 2.0 GHz		+46		dBm
Rise/Fall Time	t_{RISE}/t_{FALL}	10%/90% RF rise/ 90%/10% RF fall time		5		nS
ON/OFF Time	t_{ON}/t_{OFF}	50% V_{CTL} to 90%/10% RF		15		nS
Control Voltage High	V_{IH}	Positive Control	+2.7		+7.0	V
Control Voltage Low	V_{IL}	Positive Control	-0.25		0.25	V
Control Voltage High	V_{IH}	Negative Control	-7.0		-4.5	V
Control Voltage Low	V_{IL}	Positive Control	-0.25		0.25	V
Digital Input Leakage	I_{IN}	V_{CTL} = 5.0V		50	200	µA

1. All operating characteristics are guaranteed over full performance temperature range but not tested.

TABLE 3: ABSOLUTE MAXIMUM RATINGS

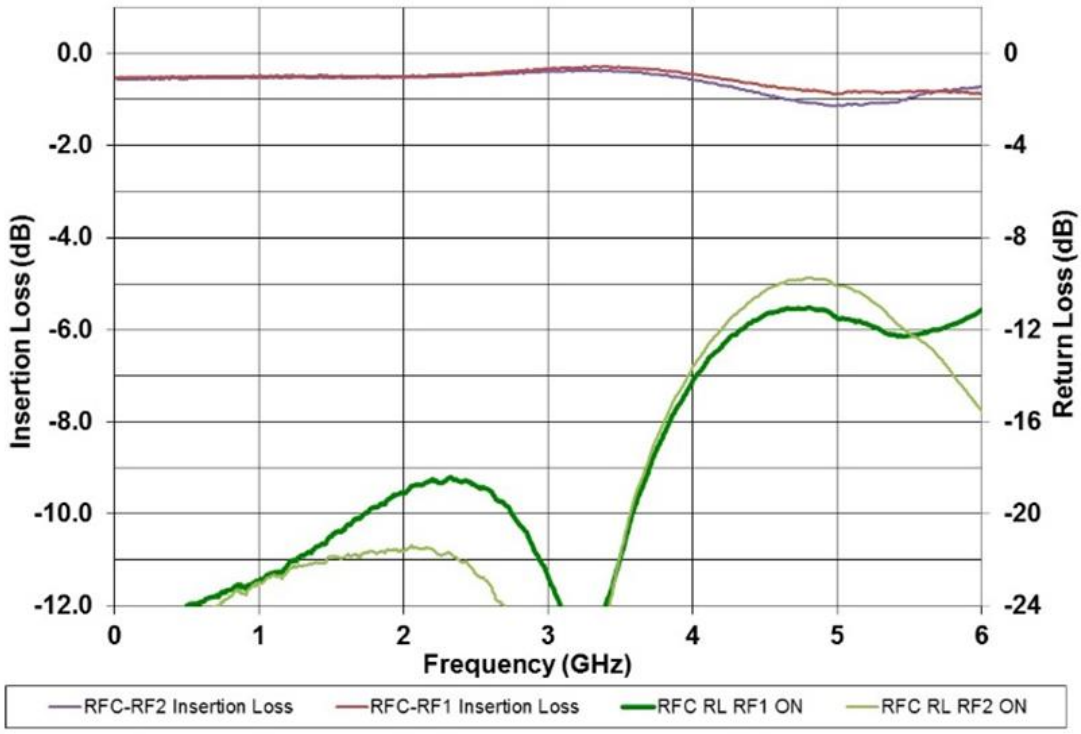
Characteristic	Min.	Max.	Units
Control voltage (A+B)	-7.5	+7.5	V
RF Input power		+30	dBm
Operating temperature	-55	+125	˚C
Storage temperature	-65	+150	˚C
Thermal resistance		53.7	˚C/W
ESD sensitivity (HBM)		200 (Class 0)	V

Caution: Class 0 (HBM 200V) Electrostatic Sensitive Device. Proper ESD precaution should be used when handling device.

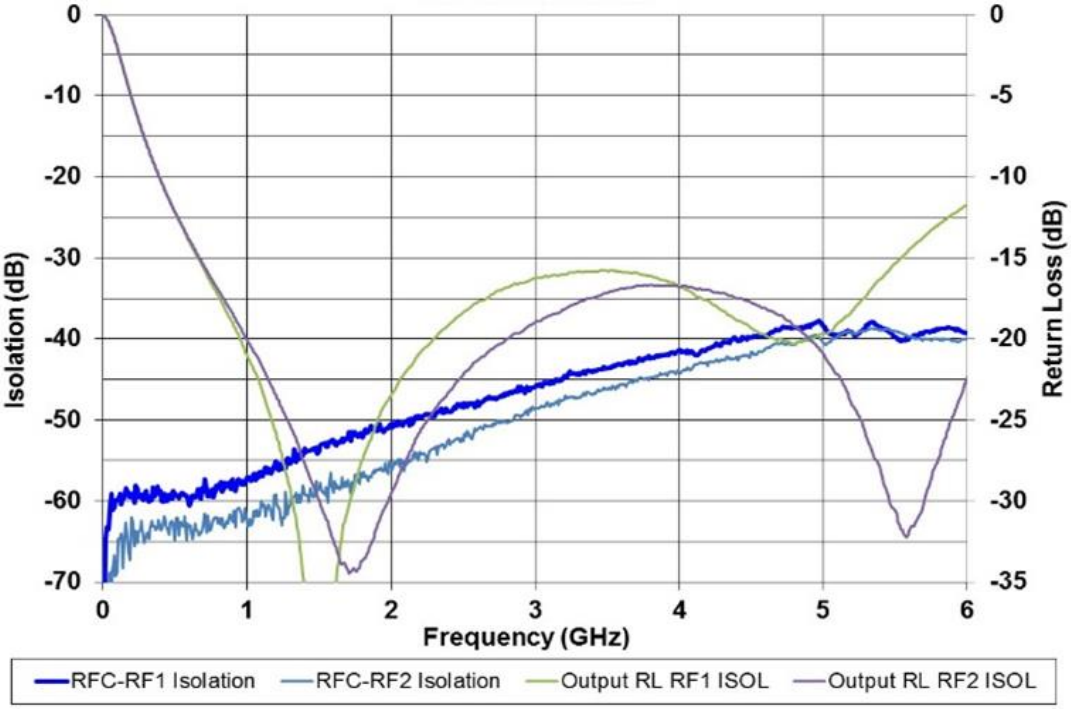
1. Unit shall survive operation without damage over the temperature range but not tested.

TYPICAL PERFORMANCE (+25 °C)

Insertion Loss/Return Loss vs Frequency



Isolation/Return Loss vs Frequency



TRUTH TABLE (NEGATIVE CONTROL)

A	B	RF Path
0	-5	RFC—RF1
-5	0	RFC—RF2

TRUTH TABLE (POSITIVE CONTROL)

A	B	RF Path
+5	0	RFC—RF1
0	+5	RFC—RF2

Note: External blocking capacitors are required on all RF ports. Capacitor should be selected to allow for low frequency operation.

SCHEMATIC

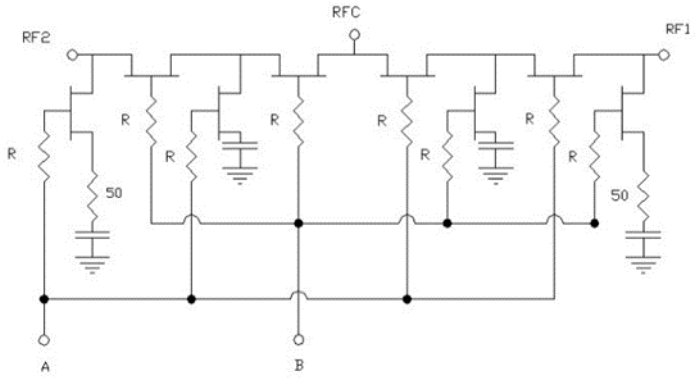
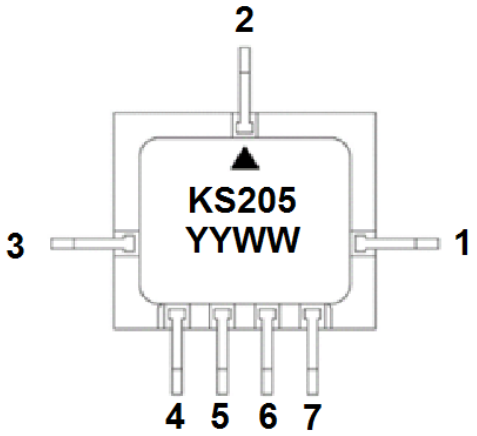


FIGURE 1: DEVICE MARKING/PIN OUT



XXX = Serial # will be added for Class B and S Part #

PIN	Designation
1	RF2
2	RFC
3	RF1
4	GND
5	A
6	B
7	GND

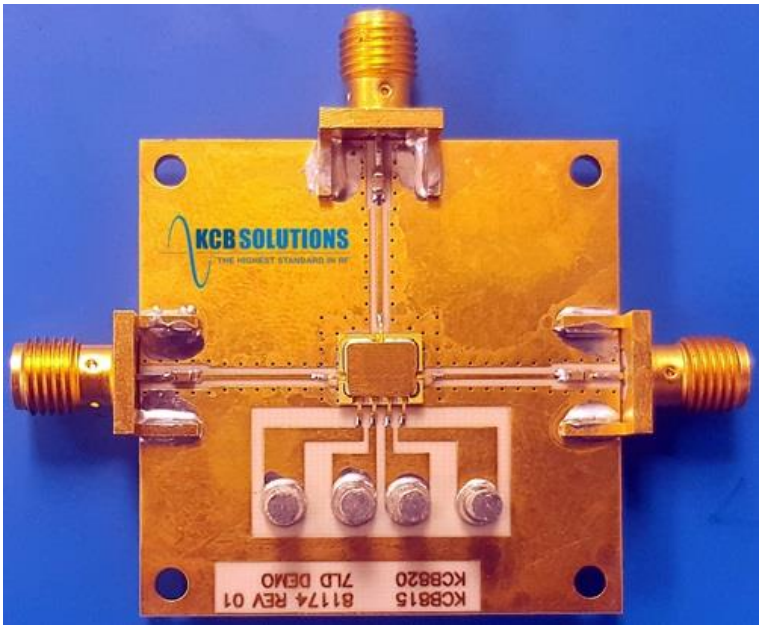
PACKAGE NOTES:

- Lid: ASTM F-15 Alloy
- Base/Walls: Alumina
- Lid/Bottom Finish: Gold over Nickel

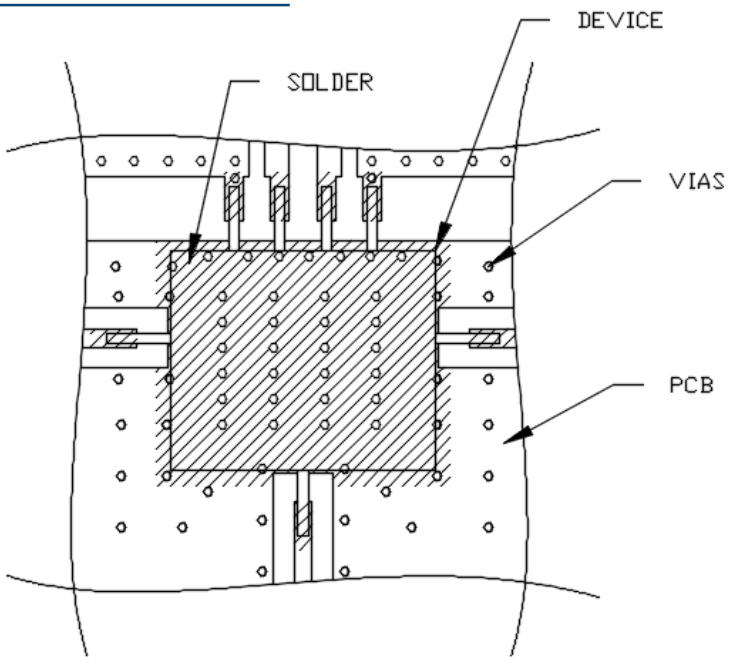
ADDITIONAL NOTES:

- Maximum reflow temperature: 265°C for 90 seconds maximum
- Package base is RF ground
- External blocking capacitors required on all RF ports

KS205 EVALUATION BOARD



RECOMMENDED SOLDER LAYOUT



NOTES:

1. TRANSMISSION LINES SCALED FOR ROGERS RO4003, 0.008 INCHES THICK
2. GROUND ALL UNUSED PORTS
3. MAXIMUM REFLOW TEMPERATURE: 265C.
4. DXF FILE AVAILABLE UPON REQUEST.
5. CONTACT KCB SOLUTIONS FOR FURTHER GUIDANCE ON DEVICE PLACEMENT AND ATTACHMENT

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FIGURE 2: OUTLINE

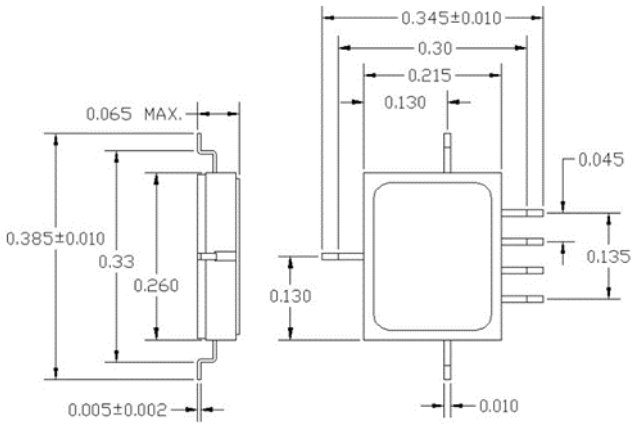

TABLE 4: SCREENING FLOW:

Test Inspection	MIL – STD -883		Requirement	
	Method	Condition	Class B	Class S
Wafer Lot Acceptance	5007		Per Table	Per Wafer Lot
Non-Destructive Bond Pull	2023		Process under SPC	Process under SPC
Internal Visual	2010	A = Class S, B = Class B	100%	100%
Temperature Cycle	1010	C, 10 Cycles	100%	100%
Acceleration	2001	E (Y1 only)	100%	100%
PIND	2020	A (5 Cycles)	N/A	100%
Serialization	IAW Figure 1		100%	100%
Radiographic	2012	2 Views	N/A	100%
Electrical Test	Table 1	+25˚C	100%	100%
Burn In	1015	A	100%/160 Hrs/125OC	100%/240 Hrs/125OC
Final Electrical	Table 1	+25˚C	100%	100%
PDA Calculation	5004	25% Δ IL / 100% Δ I_{CC}	5%	5%/3% Functional
Group A Electrical[5]	Table 1 Table 2	-55˚C and + 125˚C +25˚C only	45/0	45/0
Seal: Fine Leak Gross Leak	1014	A C	100%	100%
External Visual	2009		100%	100%

Notes:

1. Product under configuration control per KCB QAP 015.
2. Customer will be notified of all class 1 changes for Class B and S part numbers.
3. Wafer Lot Acceptance will include 100% die visual, SEM analysis and Lot Traceability.
4. Electrical Test Data will be recorded for each serial number and included in Final Test Report for all Class S part numbers.
5. Group A Electrical testing will include the Small Signal at the Min/Max operating condition. The Dynamic test (P1dB, IP3, SS) will be tested at +25c only.

ORDERING INFORMATION:

	Unscreened	Class B	Class S
KCB Solutions Part Number	KS205C	KS205B	KS205S