Aerospace and Defense

Mission Critical Communications

The Sky is Not the Limit

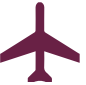
Mission critical communications require precision systems that must operate faultlessly under the most extreme conditions. Failure is not an option. Skyworks is pleased to enable a diverse set of aerospace and defense applications – all designed with the quality and high reliability to ensure they work day-in and day-out without fail.

In addition to standard consumer off-the-shelf (COTS) solutions, we offer a wide range of technical ceramics and advanced materials through our RF Ceramics business unit, formerly known as Trans-Tech, and high-reliability ceramic hermetic packaged devices via our Space and Defense business unit, formerly known as Isolink, both of which are wholly-owned subsidiaries of Skyworks Solutions.

Within our advanced technical ceramics portfolio, we offer a complete line of RF and microwave materials that includes dielectric resonators and coaxial transmission line elements for dielectric resonator oscillator (DRO) and voltage-controlled oscillator (VCO) applications, ceramic bandpass filters, ferrite and garnet material for circulators/isolators, as well as materials in technical powders or ingot form.

Through our space and defense product line we provide upscreened and hermetically sealed high-reliability optocouplers, RF diodes and RFICs including multi-chip modules (MCM). Product upscreening for parts include the equivalent of Class B and Class S of MIL-PRF-38535, Class H and Class K of MIL-PRF-38534, and JANS, JANTX and JANTXV level of MIL-PRF-19500.

Aerospace


Avionics

Surveillance Systems

Homeland Security

Microwave Subsystems

Global Positioning Systems

Portable Radio Communications

Radar

Satellite

The Right Design Choice Starts Here

Skyworks is continually releasing new products. We invite you to review this brochure as well as our website for a complete list of our solutions.

Certifications

As an industry leader, Skyworks and its wholly-owned subsidiaries have demonstrated their quality leadership and enhanced commitment to customer satisfaction through formal, third-party registration to ISO 9001, ANSI/ESD S.20.20, and ISO 14001.

Company	ISO 9001	ANSI/ESD S.20.20	ISO 14001
Skyworks Solutions, Inc.	•	•	•
Trans-Tech, Inc. (RF Ceramics)	•		•
Isolink (Space and Defense)	•		

ISO 9001

ISO 9001 is an internationally recognized Quality Management System standard that promotes customer satisfaction through continual improvement of the system's effectiveness. ISO 9001 provides a model for a Quality Management System which focuses on the effectiveness of the processes in a business to achieve desired results. The standard endorses the adoption of a process approach emphasizing the requirements, added value, process performance and effectiveness, and continual improvement through objective measurements.

ANSI/ESD S.20.20

ANSI/ESD S.20.20 is a standard for the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment. The standard covers the requirements necessary to design, establish, implement, and maintain an Electrostatic Discharge (ESD) Control Program.

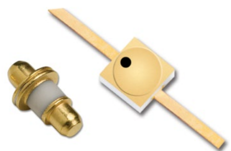
ISO 14001:2004

Skyworks is committed to the protection and preservation of the environment in all its business operations. We understand that our actions today can have environmental impacts tomorrow. Improvements at our facility will affect our customers and ultimately consumers. To this end, we have an established ISO 14001 certified Environment Management System by which we operate. We build products in consideration of regulatory and industry requirements, such as Restriction of Hazardous Substances Derivative (RoHS), and offer lead (Pb)-free, RoHs-compliant, and Green™ solutions to meet the needs of our customers in today's environmentally-conscious market.

1. Woburn, MA and Mexicali, B.C. sites

High-reliability Screening Capabilities

Skyworks can perform up to JANS level high-reliability testing on ceramic packaged diode devices in accordance with MIL-PRF-19500, and Element Evaluation on unpackaged dice and beam-lead diode devices in accordance with MIL-PRF-38534. We also offer lot approval services for sensitive circuits. The table below shows screening requirements for ceramic packaged diode devices.



Screening Requirements for Ceramic Packaged Diode Devices

Screening Requirement in Accordance with Table E-IV-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
1	Pre-Cap Inspection	MIL-STD-750 – Method 2070		•	•	
2	High-Temperature Bake	MIL-STD-750 – Method 1032	t = 24 Hours	•	•	•
3	Temperature Cycling	MIL-STD-750 – Method 1051	20 Cycles. Condition C	•	•	•
4	Constant Acceleration	MIL-STD-750 – Method 2006	Condition A Y1 Axis Only	•	•	•
5	PIND	MIL-STD-750 – Method 2052	Condition A	•		
6	Initial Electrical Test		Serialize, Read and Record	•	•	•
7	High-Temperature Reverse Bias	MIL-STD-750 – Method 1038	Condition A, t = 48 Hours	•	•	•
8	Interim Electricals		Read and Record	•	•	•
9	Burn-in	MIL-STD-750 – Method 1038	Condition B, (JANS t = 240 Hours, JANTX & JANTXV t = 160 Hours)	•	•	•
10	Final Electrical Test		Group A, Subgroup 2 and 3. Read and Record	•	•	•
11	Delta Calculation		Compare Interim Test to Final Test	•	•	•
12	PDA		Percent Defective Allowable (JANS = 5% Max.; JANTX and JANTXV = 10% Max.)	•	•	•
13	Fine Leak	MIL-STD-750 – Method 1071	Condition H	•	•	•
14	Gross Leak	MIL-STD-750 – Method 1071	Condition C	•	•	•
15	X-ray	MIL-STD-750 – Method 2076		•		
16	External Visual Inspection	MIL-STD-750 – Method 2071		•	•	•
17	Case Isolation	Not Applicable				

Screening Requirements for Ceramic Packaged Diode Devices

Group A Inspection in Accordance with Table E-IV-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 1						
1	Visual and Mechanical Inspection	MIL-STD-750 – Method 2071	Sample Size: JANS = 15(0), JANTX and JANTXV = 45(0)	•	•	•
Subgroup 2						
1	Electrical Testing		DC (Static) @ T_A = 25 °C, Sample Size = 116(0)	•	•	•
Subgroup 3						
1	Electrical Testing		DC (Static) @ Min. and Max. Operating Temp., Sample Size = 116(0)	•	•	•
Subgroup 4						
1	Electrical Testing		Dynamic @ T_A = 25 °C, Sample Size = 116(0)	•	•	•
Subgroup 5 – Not Applicable						
Subgroup 6 – Not Applicable						
Subgroup 7 – Not Applicable						

Group B Inspection for JANS Devices in Accordance with Table E-VIA-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 1			Large Lot = 22(0), Small Lot = 8(0)			
1	Physical Dimensions	MIL-STD-750 – Method 2066	Sample Size	•		
Subgroup 2						
1	Solderability	MIL-STD-750 – Method 2026	Sample Size – Large Lot = 15(0) Leads, Small Lot = 6(0) Leads	•		
2	Resistance to Solvents	MIL-STD-750 – Method 1022	Sample Size – Large Lot = 15(0) Devices, Small Lot = 6(0) Devices	•		
Subgroup 3			Large Lot= 22(0), Small Lot = 6(0)			
1	Temperature Cycling	MIL-STD-750 – Method 1051	100 Cycles. Condition C, Sample Size	•		
2	Fine Leak	MIL-STD-750 – Method 1071	Condition H, Sample Size	•		
3	Gross Leak	MIL-STD-750 – Method 1071	Condition C, Sample Size	•		
4	Electrical Testing		DC @ T_A = 25 °C, Sample Size	•		
5	Decap Internal Visual	MIL-STD-750 – Method 2075	Sample Size = 6(0)	•		
6	Bond Strength	MIL-STD-750 – Method 2037	The same number of devices used for bond strength will also be used for die shear.	•		
7	Die Shear	MIL-STD-750 – Method 2017	The same number of devices used for bond strength will also be used for die shear.	•		
Subgroup 4			Large Lot = 22(0), Small Lot = 12(0)			
1	Intermittent Operation Life	MIL-STD-750 – Method 1037	2,000 Cycles. Condition D, Sample Size	•		
2	Electrical Testing		DC @ T_A = 25 °C, Sample Size	•		

Screening Requirements for Ceramic Packaged Diode Devices

Group B Inspection for JANS Devices in Accordance with Table E-VIA-MIL-PRF-19500 (continued)

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 5			Large Lot = 22(0), Small Lot = 12(0)			
1	Accelerated Steady-State Operation Life	MIL-STD-750 – Method 1027	1,000 Hours Sample Size	•		
2	Electrical Testing		Subgroups 2 and 3	•		
Subgroup 6 – Available Upon Request						
1	Thermal Resistance	MIL-STD-750 – Method 4081	Sample Size – Large Lot = 22(0), Small Lot = 8(0)	•		
Subgroup 7			Large Lot = 32(0), Small Lot = 12(0)			
1	High Temperature Life	MIL-STD-750 – Method 1032	t = 340 Hours @ Max. Rated Storage Temp.,	•		
2	Electrical Testing		DC @ T_A = 25 °C, Sample Size	•		

Group B Inspection for JANTX and JANTXV in Accordance with Table E-VIB-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 1						
1	Solderability	MIL-STD-750 – Method 2026	Sample Size = 15(0) Leads, Small Lot = 4 (0) Leads		•	•
2	Resistance to Solvents	MIL-STD-750 – Method 1022	Sample Size = 15(0), Small Lot = 3(0) Devices		•	•
Subgroup 2			Sample Size = 22(0), Small Lot 6(0)			
1	Temperature Cycling	MIL-STD-750 – Method 1051	25 Cycles. Condition C		•	•
2	Fine Leak	MIL-STD-750 – Method 1071	Condition H		•	•
3	Gross Leak	MIL-STD-750 – Method 1071	Condition C		•	•
4	Electrical Testing		DC @ T_A = 25 °C		•	•
Subgroup 3			Sample Size = 45(0), Small Lot = 12(0)			
1	Steady-State Operation Life	MIL-STD-750 – Method 1027	t = 340 Hours		•	•
2	Electrical Testing		DC @ T_A = 25 °C		•	•
3	Bond Strength	MIL-STD-750 – Method 2037	Sample Size = 11 Wires(0)		•	•
Subgroup 4						
1	Decap Internal Visual	MIL-STD-750 – Method 2075	Sample Size = 1(0)		•	•
Subgroup 5 – Available Upon Request						
1	Thermal Resistance	MIL-STD-750 – Method 4081	Sample Size = 15(0), Small Lot = 6(0)		•	•
Subgroup 6			Sample Size = 32(0), Small Lot = 12(0)			
1	High Temperature Life	MIL-STD-750 – Method 1032	t = 340 Hours @ Max. Rated Storage Temp.,		•	•
2	Electrical Testing		DC @ T_A = 25 °C		•	•

Screening Requirements for Ceramic Packaged Diode Devices

Group C Inspection in Accordance with Table E-VII-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 1						
1	Physical Dimensions	MIL-STD-750 – Method 2066	Sample Size = 15(0), Small Lot = 6(0)		•	•
Subgroup 2			Sample Size = 22(0), Small Lot = 6(0)			
1	Thermal Shock	MIL-STD-750 – Method 1056	Condition B	•	•	•
2	Temperature Cycling	MIL-STD-750 – Method 1051	25 Cycles. Condition C	•	•	•
3	Terminal Strength	MIL-STD-750 – Method 2036		•	•	•
4	Fine Leak	MIL-STD-750 – Method 1071	Condition H	•	•	•
5	Gross Leak	MIL-STD-750 – Method 1071	Condition C	•	•	•
6	Moisture Resistance	MIL-STD-750 – Method 1021		•	•	•
7	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 3			Sample Size = 22(0), Small Lot = 6(0)			
1	Shock	MIL-STD-750 – Method 2016	1,500 Gs, X1, Y1 and Z1.	•	•	•
2	Vibration, Variable Frequency	MIL-STD-750 – Method 2056		•	•	•
3	Constant Acceleration	MIL-STD-750 – Method 2006	10,000 Gs, X1, Y1 and Z1.	•	•	•
4	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 4						
1	Salt Atmosphere	MIL-STD-750 – Method 1041	Sample Size = 15(0), Small Lot = 6(0)	•	•	•
Subgroup 5 – Available Upon Request						
1	Thermal Resistance	MIL-STD-750 – Method 4081	Sample Size = 15(0), Small Lot = 6(0)	•	•	•
Subgroup 6			Sample Size = 22(0), Small Lot = 12(0)			
1	Steady-State Operation Life	MIL-STD-750 – Method 1026	1,000 Hours	•	•	•
2	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 7 – Not Applicable						

Screening Requirements for Ceramic Packaged Diode Devices

Group E Inspection in Accordance with Table E-IX-MIL-PRF-19500

Step	Process	Conditions	Comments	JANS	JANTXV	JANTX
Subgroup 1			Sample Size = 45(0)			
1	Temperature Cycling	MIL-STD-750 – Method 1051	500 Cycles. Condition C	•	•	•
2	Fine Leak	MIL-STD-750 – Method 1071	Condition H	•	•	•
3	Gross Leak	MIL-STD-750 – Method 1071	Condition C	•	•	•
4	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 2			Sample Size = 45(0)			
1	Steady-State Operation Life	MIL-STD-750 – Method 1026	t = 1,000 Hours	•	•	•
2	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 3 – Not Applicable						
Subgroup 5 – Available Upon Request						
1	Thermal Impedance			•	•	•
Subgroup 5 – Not Applicable						
Subgroup 6						
1	ESD	MIL-STD-750 – Method 1020	Sample Size = 11(0)	•	•	•
Subgroup 7			Sample Size = 3(0)			
1	Resistance to Soldering Heat	MIL-STD-750 – Method 2031		•	•	•
2	External Visual Inspection	MIL-STD-750 – Method 2071		•	•	•
3	Fine Leak	MIL-STD-750 – Method 1071	Condition H	•	•	•
4	Gross Leak	MIL-STD-750 – Method 1071	Condition C	•	•	•
5	Electrical Testing		DC @ T_A = 25 °C	•	•	•
Subgroup 8 – Not Applicable						
Subgroup 9 – Not Applicable						

Screening Requirements for Hybrid Microcircuits

Screening Requirement in Accordance with Table C-IX of MIL-PRF-38534

Step	Screen	Test Methods and Conditions	Class K	Class H
1	Preseal Burn-in	MIL-STD-883, Method 1030	Optional	Optional
2	"100% Nondestructive Bond Pull"	MIL-STD-883, Method 2023, 2% PDA	100%	Optional
3	Internal Visual	MIL-STD-883, Method 2017	100%	100%
4	Temperature Cycling	"MIL-STD-883, Method 1010, Condition C"	100%	100%
5	Constant Acceleration	"MIL-STD-883, Method 2001, Condition 3,000 g, Y1 Direction Only"	100%	100%
6	"Particle Impact Noise Detection (PIND) See Note 1"	"MIL-STD-883, Method 2020, Condition A (Class K) or B"	100%	Optional
7	Preburn-in Electrical Test	"Table 6-3, Subgroup 1; Read and Record"	100%	Optional
8	Burn-in	"MIL-STD-883, Method 1015, at 125 °C Minimum"	160 Hours	160 Hours
9	Interim Electrical	Group A (Read and Record)	100%	
10	Burn-in	"MIL-STD-883, Method 1015, at 125 °C Minimum"	160 Hours	
11	Final Electrical Test	"Table 6-3, Subgroup 1 -3, 9-11; Read and Record Delta per Table 6-4."	100%	100%
12	PDA	"Calculate Delta and Percent Defective"	100%	100%
13	Fine Leak	"MIL-STD-883, Method 1014, Conditions A or B"	100%	100%
14	Gross Leak	MIL-STD-883, Method 1014, Condition C	100%	100%
15	X-ray	MIL-STD-883, Method 2012	100%	Optional
16	External Visual	MIL-STD-883, Method 2009	100%	100%

Screening Requirements for Microcircuits

Screening Requirement in Accordance with Table IA of MIL-PRF-38535

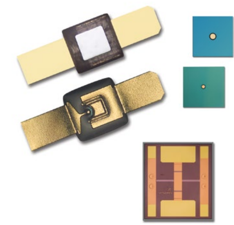
Step	Screening Tests	Class B	Class S
1	Wafer Lot Acceptance Test	"QM plan (See H.3.2.1.4) 1/"	"QM plan (see H.3.2.1.4) or TM 5007 of MIL-STD-883 (All Lots)"
2	"Nondestructive bond pull (NDBP) test"		TM 2023
3	Internal Visual Inspection	TM 2010, Condition B	TM 2010, Condition A
4	Temperature Cycling	"TM 1010, Condition C, 10 Cycles Minimum"	"TM 1010, Condition C, 10 Cycles Minimum"
5	Constant Acceleration	TM 2001, Condition E (Minimum), Y1 Orientation Only	TM 2001, Condition E (Minimum), Y1 Orientation Only
6	Visual Inspection	100%	100%
7	"Particle Impact Noise Detection (PIND) test"		"TM 2020, Test Condition A on Each Device"
8	Serialization	In Accordance with Device Specification (100%)	In Accordance with Device Specification (100%)
9	Pre burn-in (Interim) Electrical Parameters Test	In Accordance with Device Specification	In Accordance with Device Specification
10	"Burn-in test"	"TM 1015 160 Hours at +125 °C Minimum"	"TM 1015 240 Hours at 125 °C, Condition D"
11	Post Burn-in (Interim) Electrical Parameters Test		In Accordance with Device Specification
12	"Reverse Bias Burn-in Test (Static Burn-in)"		"TM 1015, Condition A or C; 144 Hours at +125 °C or 72 Hours at +150 °C Minimum"
13	"Post Burn-in (Interim-reverse Bias) Electrical Parameters Test"		In Accordance with Device Specification
		Class Q (Class Level B)	Class V (Class Level S)
14	"Percent Defective Allowable (PDA) Calculation"	5 Percent PDA (All Lots)	"5 Percent PDA, 3 Percent PDA for Functional Parameters at 25 °C (All Lots)"
15	"Final Electrical Tests a. Static Test: (1) at 25 °C (2) Maximum and Minimum Operating Temperature b. Dynamic or Functional Test: (2) Maximum and Minimum Operating Temperature c. Switching Test: (1) at 25 °C (2) Maximum and Minimum Operated Temperature"	"In Accordance with Applicable Device Specification (See Group A Test)"	"In Accordance with Applicable Device Specification (See Group A Test)"
16	"Seal Test a. Fine Leak b. Gross Leak"	TM 1014	TM 1014
17	"Radiographic (X-ray) and/or C-SAM test"		X-ray: TM 2012, Two Views; C-SAM TM 2030
18	"External Visual Inspection"	TM 2009	TM 2009
19	Qualification or Quality Conformance Inspection/TCI Test Sample Selection		
20	Radiation Dose Rate Induced Latch-up Test	TM 1020	TM 1020

High-reliability Product Flow for Element Evaluation for Unpackaged Devices

Skyworks offers discrete "bare die" and beam-lead products with Class H and Class K element evaluation in accordance with MIL-PRF-38534 for microcircuit and semiconductor die and for passive devices.

IE: CLA4601-000 = Commercial Product Flow
CLA4601H000 = Class H
CLA4601K000 = Class K

Product	MIL-PRF-38534	Application
Bare Die	Class H Class K	Military Space



Chip Element Evaluation for Microcircuits and Semiconductors

	Mil-Std-883		Requirement	
Test Inspection	Method	Condition	Class H	Class K
Element Electrical	Per Product Specification	On-wafer	100%	100%
Element Visual	2010	A = Class K B = Class H	100%	100%
Internal Visual	2010		10/0	10/0
Stabilization Bake	1008	C	N/A	10/0
Temperature Cycling	1010	C	N/A	10/0
Mechanical Shock or Constant Acceleration	2002 2001	B, Y1 Direction A, Y1 Direction	N/A	10/0 10/0
Interim Electrical	Per Product Specification	25 °C, Min. and Max. Operating Temps.	N/A	
Burn-in	1015	240 Hours Min. @ 125 °C	N/A	10/0
Post Burn-in Electrical	Per Product Specification	25 °C, Min. and Max. Operating Temps.	N/A	10/0
Steady-State Life	1005	1,000 Hours Min. @ 125 °C	N/A	10/0
Final Electrical	Per Product Specification	25 °C, Min. and Max. Operating Temps.	10/0	10/0
Wire Bond Evaluation	2011	C	10/0	10/0
SEM	2018		N/A	4/0

Chip Element Evaluation for Passive Devices

	Class			MIL-STD-883			
Subgroup	K	H	Test	Method	Condition	Quantity (Accept Number)	Reference Paragraph
1	•	•	Element Electrical			100%	C.3.4.1
2	•	•	Visual Inspection	2032		100% 22 (0)	C.3.4.2
	• • • • • • •	 •	Temperature Cycling Mechanical Shock or Constant Acceleration Voltage Conditioning or Aging (Capacitors) Visual Inspection Electrical	1010 2002 2001 2032	C B, V1 Direction 3,000Gs Y1 Direction	10 (0) 10 (0) 10 (0) 10 (0) 10 (0) 10 (0) 10 (0)	C.3.4.3 C.3.4.7 C.3.4.5 C.3.4.4
4	•	•	Wire Bond Evaluation	2011		10 (0) Wires or 20 (1) Wires	C.3.4.3 C.3.4.6

The Right Products for Your System Applications

Skyworks has the RF products you need to speed your design from concept to production. Figure 1 shows Skyworks' transceiver (simplified) block diagram.

Applications

- Avionics systems
- Electronic Countermeasures (ECM) equipment
- Electronic Warfare (EW)
- Global Positioning System (GPS)
- Improvised Explosive Device (IED)
- Instrumentation
- Joint Tactical Radio System (JTRS)
- Land Mobile Radio (LMR)
- Microwave subsystems
- Software Defined Radio (SDR)
- Surveillance receivers or jammers
- Traffic Collision Avoidance System (TCAS)

Products

- Amplifiers
- Attenuators
- Ceramic filters
- Circulators and isolators
- Detectors
- Couplers
- Demodulators
- Diodes
- Mixers
- Modulators
- Optocouplers
- Optoisolators
- Power splitters / combiners
- Resonators
- Switches

Many of the functions in the diagram below can be integrated into a customized MCM solution.

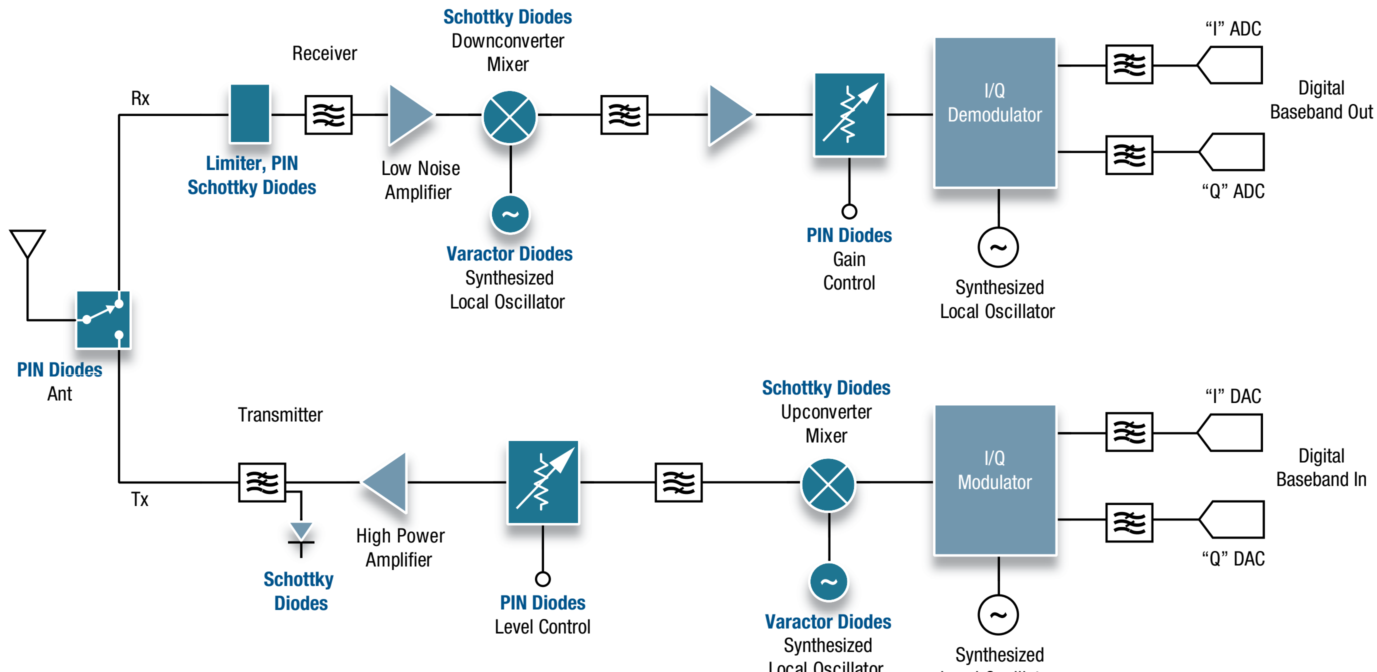


Figure 1. Transceiver (Simplified) Block Diagram

Featured Products

Amplification

Low Noise Amplifiers and Transistors

Part Number	Frequency Range (GHz)	Test Frequency (GHz)	Gain (dB)	OIP3 (dBm)	$OP_{1\,dB}$ (dBm)	V_{DD} (V)	Typ. Supply Current (mA)	Typ. NF (dB)	Package (mm)
SKYH22001	0.3–3.8	–	–	30	–	3.3	45	1.2	Hermetic 14-pin 7 x 7 x 0.635
SKYH22002	0.1–6.0	–	–	34	20	5	100	4.5	Hermetic 14-pin 7 x 7 x 0.635

Attenuation

Digital Attenuators

Part Number	Frequency Range (GHz)	Number of Bits	Least Significant Bit (dB)	Control Interface	Maximum Attenuation (dB)	Typical Insertion Loss (dB)	Typical IIP3 (dBm)	Package (mm)
SKY12406-360LF	0.05–0.6	1	12	Parallel	12	0.3	46	QFN 8L 2 x 2 x 0.9
SKY12343-364LF	0.01–4.0	7	0.25	SPI or Parallel	31.75	1.8–1.9	50	QFN 32L 5 x 5 x 0.9

Circulation and Isolation

Circulators

Part Number	Frequency (MHz)	Insertion Loss (dB)	Isolation (dB)	Return Loss (dB)	Rotation	Max. Power (W) F/R	Case Size (Inch/mm)	Package
MAFR-000677-000001	2700–3100	0.35	20	20	CW	1300/1300	$0.75^2/19^2$	Drop-in
SKYFR-000784	1350–1850	0.50	18	18	CCW	1000	1.0/25.4	Drop-in

DC Blocking and Filtering

MIS Silicon Chip Capacitors—Low Frequency to 20 GHz

Part Number	Capacitance Value (pF) ±20%	Die Size (mils)
SC00080912	0.8	12 x 12
SC99906068	1000	68 x 68

Screened bare die, epoxy and ceramic hermetic packaged versions of these devices are available. For more information, please visit www.skyworksinc.com.

Demodulation

Mixer Modules with Built-in Voltage Controlled Oscillators (VCOs)

Part Number	Operating Frequency (MHz)	IF Frequency (MHz)	Architecture	Power Down	Built-In LO Drivers	Built-In PLL/VCO	Conversion Gain	IIP3 (dBm)	V_{CC} (V)	NF (dB)	Package (mm)
SKY73212-11	1700–2000	40–300	Diversity	Yes	Yes	Integer-N	9	24	5	11	44-pin MCM 10 x 6 x 1.05
SKY73208-11	350–5000	50–500	Single	Yes	Yes	Integer-N	6	26	5	14	36-pin MCM 6 x 6 x 1.35

Filtering

Ceramic Filters

Part Number	Market Segment	Filter Type	Size/ poles	F_0	Bandwidth (MHz)	Insertion Loss (dB)	Package
TT3P4-1255P2-8025	Radio Communications	Band Pass	3 mm/4 pole	1225	80	2.5	SMT
TT4P2-1575P3-1014	GPS	Band Pass	4 mm/2 pole	1575	10	1.4	SMT

Power Detection

Chip, Beam Lead and 0201 CSP—Low Frequency to 100 GHz

Base Part Number	Minimum Detectable Signal (dBm)	Barrier Height	Input Signal Frequency Range	Maximum Capacitance (pF)	Configuration
CDC7630-000	-52	ZBD	–	0.25	Single junction
DME2333-000	-45	Medium	Ku band	0.05–0.15	Single junction

Receiver Protection

Silicon Limiter Diode Chips—Low Frequency to 36 GHz

						Thermal Impedance	
Part Number	V_B @ 10 µA (V)	Typ. C_J @ 0 V (pF)	Max. C_J @ 6 V (pF)	Max. R_S @ 10 mA (Ω)	Max. T_L @ 10 mA (ns)	Max. Average (C/W)	Typ. 1 µs Pulse (C/W)
CLA4601-000	15–30	0.12	0.10	2.5	5	120	15
CLA4607-000	120–180	0.20	0.15 @ 50 V	2.0	50	40	1.2

Screened bare die, epoxy and ceramic hermetic packaged versions of these devices are available. For more information, please visit www.skyworksinc.com.

Limiter Modules

Integrated Single-Stage PIN Diode Limiter

Part Number	RF Test Freq. (GHz)	Typ. Insertion Loss (dB) P_{IN} = 0 dBm	Typ. Return Loss (dB) P_{IN} = 0 dBm	Typ. Threshold Level (dBm)	Maximum Saturated Power (Watts)	Typ. Flat Leakage Power (dBm) P_{IN} = 10 dBm	Package (mm)
SKY16601-555LF	2.5	0.1	27.5	11	29	13 (P_{IN} = 20 dBm)	MLP 2L 2.5 x 2.5 x 0.75

Switching

Chip PIN Diodes—Low Frequency to 36 GHz

Part Number	V_B @ 10 µA (V)	Nominal I-Region (µm)	Typ. C_J @ 0 V (pF)	Max. C_J @ 50 V (pF)	Max. R_S @ 10 mA (Ω)	Max. T_L @ 10 mA (ns)	Max. Thermal Resistance (C/W)
APD0505-000	50	5	0.10	0.05	2.0	20	100

Screened bare die, epoxy and ceramic hermetic packaged versions of these devices are available. For more information, please visit www.skyworksinc.com.

Beam-Lead PIN Diodes—Low Frequency to 40 GHz

Part Number	V_B @ 10 µA (V)	Max. C_J @ 10 V (pF)	Max. C_J @ 50 V (pF)	Max. R_S @ 10 mA (Ω)	Typ. T_L @ 10 mA (ns)
DSM8100-000	60	0.025	–	3.5	25

Optocoupler

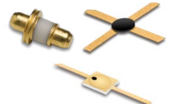
Single-channel Photo-transistor Optocouplers

Part Number	V_F (V) @ I_F = 10 mA		CTR			BVceo (V)	Vcc Max. (V)	Isolation 25 °C V_{DC} @ 1 s	Package Size (inch)
	Min.	Max.	@ I_F (mA)	Min. (%)	Max. (%)				
OLS249 [1]	1.2	1.8	1	200	1200	40	–	1500	6L 0.245 x 0.17 x 0.08
OLI100	0.9	1.7	1	100	–	30	–	1500	6L 0.1 x 0.11 x 0.65
OLF300 [1]	–	2.5	16	9	–	–	18	1000	8L 0.18 x 0.18 x 0.1

1. Radiation tolerant.

How to Select Diode Packages

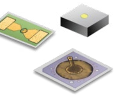
Skyworks offers epoxy and ceramic hermetic packaged diodes. Upscreened versions are also available for packaged and bare die devices. For more information, please visit www.skyworksinc.com.



Ceramic-Metal Packages

Ceramic-metal packages deliver several advantages over plastic packages: their parasitic inductances and capacitances are lower, sometimes as much as 75% lower, than that of the plastic SMT packages described above. Their thermal resistances are also much lower than that of the large majority of plastic SMT packages. Most ceramic packages used for diodes are capable of being hermetically sealed, thereby offering maximum protection to the die against environmental contaminants such as sodium (Na), water vapor, etc.

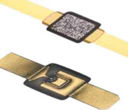
Such packages have two disadvantages compared to plastic SMT packages: they are typically more costly, and, they generally are not compatible with automated surface mount assembly.



(Packageless) Dice

Diode dice, sometimes known as chips, eliminate the parasitic reactances and thermal resistance of the package. This configuration produces the widest bandwidth of operation as well as maximal power dissipation capabilities.

Of course, the end user of diode dice must be capable of handling these tiny devices as well as performing die attach and wire bonding assembly techniques. The assemblies which contain dice must be protected from mechanical damage, especially to the fragile bond wires. Some devices are also available on film frame.



Beam-Lead Power Handling Diodes

Beam-lead diodes offer the highest frequency performance capability, due to the absence of a package and its associated parasitic reactances, and the reduction of series inductance that would be presented by a bond wire. Also, since no mechanical connection needs to be made to the terminals of the diode junction by the user, the diode junction area can be very small, thus reducing junction capacitance.

The metal beams of beam-lead diodes must be mechanically and electrically attached to the circuit in which they are used. This lead attach may be accomplished using thermocompression bonding or a combination of thermocompression and ultrasonic bonding referred to as "thermalsonic bonding," or beam attach may be done using conductive epoxy. Such assembly techniques are most frequently performed manually by skilled assemblers.

The only conduction paths for heat to flow out of the diode junction are through the metal beams, which have very small cross-sectional areas, so thermal resistance of beam-lead diodes is generally greater than 125 °C/W, sometimes substantially so. This limits the power dissipation of beam-lead diodes to relatively low power levels.

Packaging

Skyworks' products are available in the packages shown in the table below. Please refer to individual data sheets for the availability of specific diode package combinations.

Package Selection Guide

Part Number Suffix	Package Type	Actual Size	Package Dimensions (mm) (Lead Inclusive)*
-040	SOD-882 2L (0402)		1.00 x 0.60 x 0.46
-378, -385	MLPD 6-Pin		1.00 x 1.00 x 0.45
-203	Hermetic Pill		1.27 x 1.40
-517	MIS		1.47 x 1.23 x 0.70
-21	MCM		1.50 x 1.50 x 0.45
-373	QFN 8L		1.50 x 1.50 x 0.45
-079	SC-79		1.60 x 0.80 x 0.60
-219	Hermetic SMT		1.91 x 1.91 x 1.14
-396	QFN 8L		2.00 x 2.00 x 0.75
-085	QFN 2L (2 x 2) 1.7 mm Paddle		2.00 x 2.00 x 0.90
-086	QFN 2L (2 x 2) 1.7 mm Paddle		2.00 x 2.00 x 0.90
-087	QFN 2L (2 x 2)		2.00 x 2.00 x 0.90
-372	SC-70 4L		2.00 x 2.00 x 1.10
-375	QFN 10L		2.00 x 3.00 x 0.45
-313	QFN 6L		2.00 x 3.00 x 1.00
-92, -081	SC-88 (SC-70 6L)		2.10 x 2.00 x 0.95
-073, -074, -075, -076	SC-70		2.10 x 2.00 x 0.95
-377	QFN 4L		2.20 x 2.00 x 1.35
-001, -003, -004, -005, -006, -39	SOT-23 3L		2.37 x 2.92 x 1.00
-011	SOD-323		2.52 x 1.25 x 1.04
-027, -72	SOT-23 5L		2.80 x 2.90 x 1.18
-73	SOT-23 6L		2.80 x 2.90 x 1.18
-321, -348, -350	QFN (3 x 3)		3.00 x 3.00 x 0.75
-337	QFN 12L		3.00 x 3.00 x 0.90
-340	QFN 20L (4 x 4) 2.1 mm Paddle		4.00 x 4.00 x 0.75
-306	QFN 16L (4 x 4)		4.00 x 4.00 x 0.90
-355, -359, -467	QFN 16L (4 x 4)		4.00 x 4.00 x 0.90

Part Number Suffix	Package Type	Actual Size	Package Dimensions (mm) (Lead Inclusive)*
-362, -459	QFN 24L		4.00 x 4.00 x 0.90
-478	QFN 16L (4 x 4)		4.00 x 4.00 x 1.50
-86	MSOP 10L		4.90 x 3.00 x 0.96
-302, -303	MSOP 8L Exposed Pad		4.90 x 3.00 x 1.10 (Max.)
-364	QFN 32L 3.15 mm Paddle		5.00 x 5.00 x 0.90
-310	QFN 32L (5 x 5) 3.3 mm Paddle		5.00 x 5.00 x 0.90
N/A	32 Pin RFLGA		5.00 x 5.00 x 1.00
-207	Hermetic Ceramic Pill		5.08 x 2.18
-210	Hermetic Pill		5.7 x 3.15
-230	Epoxy Stripline		5.98 x 1.4 x 0.76
-232	Epoxy Stripline		5.98 x 3.69 x 0.76
-234, -235	Epoxy Stripline		5.98 x 5.98 x 0.76
-12	SOIC 8L		6.00 x 4.90 x 1.60
-80	SSOP 16L		6.00 x 4.90 x 1.60
N/A	36 Pin MCM		6.00 x 6.00 x 1.35
-87	TSSOP 16L		6.40 x 5.00 x 1.00
N/A	MCM 12L		7.00 x 7.00 x 1.10
-250, -251	Epoxy Stripline		8.12 x 2.54 x 1.27
-252, -253	Epoxy Stripline		8.12 x 5.33 x 1.27
-254	Epoxy Stripline		8.12 x 8.12 x 1.27
-255, -257	Epoxy Stripline		8.12 x 8.12 x 1.27

Packaging

Part Number Suffix	Package Type	Actual Size	Package Dimensions (mm) (Lead Inclusive)*
N/A	MCM 12L		8.385 x 8.385 x 1.35
-25	SOIC 16L		10.00 x 6.00 x 1.70
-220, -221	Hermetic Stripline		11.3 x 1.91 x 1.14
-224	Hermetic Stripline		11.3 x 11.3 x 1.14
-225	Hermetic Stripline		11.3 x 11.3 x 1.14
-222	Hermetic Stripline		11.3 x 6.6 x 1.14
-223	Hermetic Stripline		11.3 x 6.6 x 1.14
-240	Hermetic Stripline		11.52 x 2.64 x 1.18

Package Type	Actual Size	Package Dimension (inch)
6-Lead Ceramic Carrier Chip for Hybrid Assembly		0.1 x 0.11 x 0.65
4-Lead Ceramic Carrier Chip for Hybrid Assembly		0.170 x 0.095 x 0.085
8-Lead Hermetic Ceramic Flat		0.18 x 0.18 x 0.10
4-Lead Hermetic TO-72		0.22 x 0.185 x 0.69
6-Lead Hermetic TO-5		0.200 x 0.302 x 0.745
6-Lead Hermetic Ceramic LCC		0.245 x 0.170 x 0.08
8-Lead Hermetic Ceramic LCC		0.245 x 0.170 x 0.08
8-Lead Hermetic Dip		0.39 x 0.32 x 0.15

*Dimensions indicated: lead tip to lead tip x body width x total thickness.

Screened bare die, epoxy and ceramic hermetic packaged versions of these devices are available. For more information, please visit www.skyworksinc.com.

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