DIODES, SILICON, POWER, SCHOTTKY RECTIFIER

BASED ON TYPES 1N5822 AND 1N5822U

ESCC Detail Specification No. 5106/020

| Issue 5 | October 2020 |

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DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
1365	Specification updated to incorporate changes per DCR.

TABLE OF CONTENTS

1   GENERAL

1.1   SCOPE
This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2   APPLICABLE DOCUMENTS
The following documents form part of this specification and shall be read in conjunction with it:

(a)   ESCC Generic Specification No. 5000
(b)   MIL-STD-750, Test Methods and Procedures for Semiconductor Devices

1.3   TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS
For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4   THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1   The ESCC Component Number
The ESCC Component Number shall be constituted as follows:

Example: 510602001

- Detail Specification Reference: 5106020
- Component Type Variant Number: 01 (as required)

1.4.2   Component Type Variants
The component type variants applicable to this specification are as follows:

Variant Number	Based on Type	Case	Terminal Finish	Weight max g
01	1N5822U	LCC2B	2	0.18
02	1N5822U	LCC2B	4	0.18
03	1N5822	Die	N/A	N/A

The terminal finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

1.5   MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Unit	Remarks
Forward Surge Current	I_{FSM}	80	A	Notes 1, 2
Working Peak Reverse Voltage	V_{RWM}	40	V	
Average Output Rectified Current	I_O	3	A	Note 3
Critical Rate of Rise of Reverse Voltage	dV/dt	10000	V/µs	
Operating Temperature Range	T_{op}	-55 to +150	°C	T_{case}, Note 4
Junction Temperature	T_j	+150	°C	
Storage Temperature Range	T_{stg}	-65 to +150	°C	Note 4
Soldering Temperature	T_{sol}	+245	°C	Note 5
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	7	°C/W	

NOTES:
1.   Sinusoidal pulse of 10ms duration.
2.   At $T_{amb} \leq$ +25°C.
3.   At $T_{case} \geq$ +139°C, derate linearly to 0A at +150°C.
4.   For Variant 02 with hot solder dip terminal finish, all testing performed at T_{amb} > +125°C shall be carried out in a 100% inert atmosphere.
5.   Duration 5 seconds maximum and the same package shall not be resoldered until 3 minutes have elapsed.

1.6   HANDLING PRECAUTIONS

These devices are susceptible to damage by electrostatic discharge. Therefore, suitable precautions shall be employed for protection during all phases of manufacture, testing, packaging, shipment and any handling.

These components are categorised as Class 3 per ESCC Basic Specification No. 23800 with a Minimum Critical Path Failure Voltage of 8000 Volts.

1.7   PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

1.7.1   Leadless Chip Carrier Package (LCC2B) - 2 Terminal
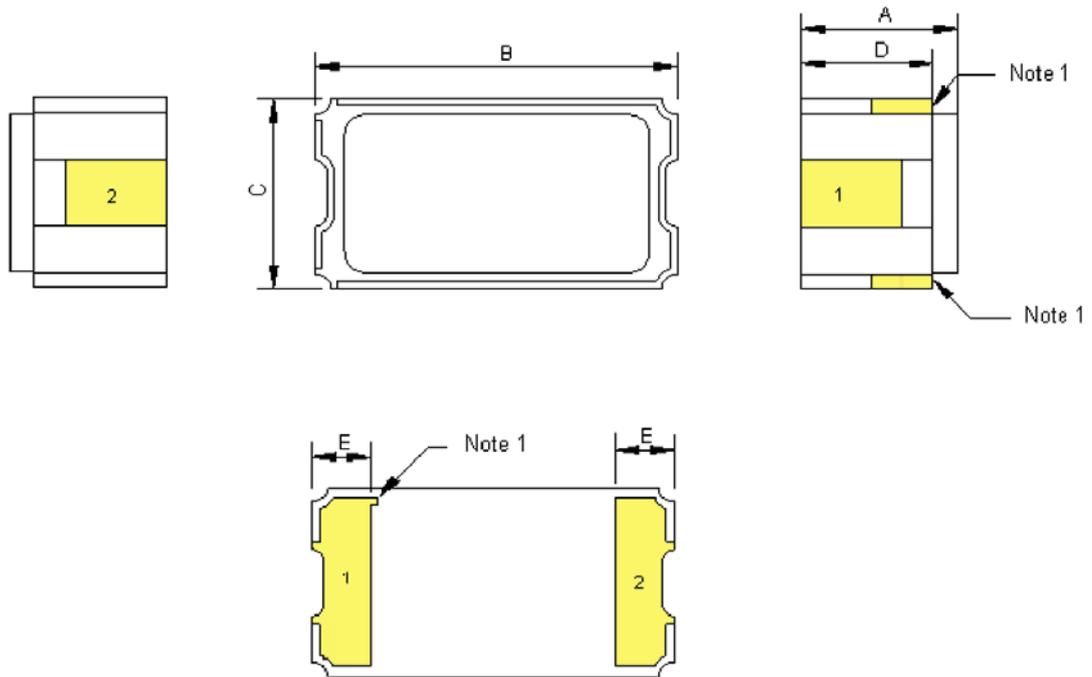
Symbols	Dimensions mm		Notes
	Min	Max	
A	2.04	2.42	2
B	5.27	5.6	
C	3.49	3.76	
D	1.71	2.09	
E	0.48	0.71	

NOTES:
1.   Terminal identification: The anode is identified by metallisation in the two castellations and by the index mark on the bottom metallisation.
2.   For Variant 02, dimension limits apply prior to solder coating of terminals.

1.7.2   Die
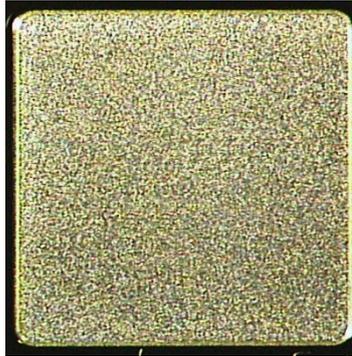
NOTES:
1.   Die materials and dimensions:
   - Die substrate: Silicon
   - Die length: 1.69 mm
   - Die width: 1.69 mm
   - Die thickness: 280 ±20µm
   - Top passivation: Pix with thickness 8.9µm or Probimide with thickness 6µm
   - Top metallisation: TiW/Ni/Al with thickness 0.1/0.08/10µm
   - Backside metallisation: Ti/Ni/Au with thickness 0.1/0.4/0.05µm
   - Pad dimensions: 1.5 × 1.5 mm
2.   Terminal identification is not applicable
3.   Bias details: top contact = anode, backside contact = cathode

1.8   FUNCTIONAL DIAGRAM

Terminal 1: Anode
Terminal 2: Cathode

NOTES:
1.   For LCC2B (Variants 01, 02), the lid is not connected to any terminal.
2.   For Die Components (Variant 03), the terminal numbering is not applicable.

1.9   MATERIALS AND FINISHES
Materials and Finishes of Packaged Components

For Variants 01 and 02, the materials and finishes shall be as follows:

(a)   Case
       The case shall be hermetically sealed and have an Aluminium Nitride body with a Kovar lid.
(b)   Terminal Finish
       As specified in Para. 1.4.2, Component Type Variants.

1.9.2   Materials and Finishes of Die Components
For Variant 03, the materials and finishes shall be as specified in Para. 1.7.2.

2   REQUIREMENTS

2.1   GENERAL
The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1   Deviations from the Generic Specification
None.

2.2   MARKING
The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component or its primary package shall be:

(a)   Terminal Identification (see Para. 1.7; not applicable to Variant 03).
(b)   The ESCC qualified components symbol (for ESCC qualified components only).
(c)   The ESCC Component Number (see Para. 1.4.1).
(d)   Traceability information.

2.3   ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES
Electrical measurements shall be performed at room, high and low temperatures. Consolidated notes are given after the tables; see Para. 2.3.3.

2.3.1   Room Temperature Electrical Measurements
The measurements shall be performed at T_{amb} = +22 ±3°C.

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions	Limits		Units
				Min	Max	
Forward Voltage	V_{F1}	4011	Pulse Method I_F = 1A, Note 1	-	400	mV
	V_{F2}	4011	Pulse Method I_F = 3A, Note 1	-	485	mV
	V_{F3}	4011	Pulse Method I_F = 9.4A, Note 1	-	700	mV
Reverse Current	I_R	4016	Pulse Method Note 1 V_R = 40V	-	80	µA
Capacitance	C	4001	V_R = 5V V_{sig} = 50mV (p-p) max f = 1MHz	-	240	pF
Thermal Impedance, Junction to Case	$Z_{th(j-c)}$	3101	I_H = 1 to 10A t_H = 50ms I_M = 50mA t_{md} = 100µs, Note 2	(Calculate ΔV_F, see Note 3)		°C/W

2.3.2   High and Low Temperatures Electrical Measurements

Characteristics	Symbols	MIL-STD-750 Test Method	Test Conditions Note 4	Limits		Units
				Min	Max	
Forward Voltage 2	V_{F2}	4011	T_{amb} = +100 (+0 -5)°C Pulse Method I_F = 3A, Note 1	-	455	mV
			T_{amb} = -55 (+5 -0)°C Pulse Method I_F = 3A, Note 1	-	560	mV
Reverse Current	I_R	4016	T_{amb} = +100 (+0 -5)°C Pulse Method Note 1 V_R = 40V	-	12	mA
			T_{amb} = -55 (+5 -0)°C Pulse Method Note 1 V_R = 40V	-	40	µA

2.3.3   Notes to Electrical Measurements Tables
1.   Pulse Width ≤ 680µs, Duty Cycle ≤ 2%.
2.   Performed only during Screening Tests Parameter Drift Values (Initial Measurements), go-no-go.
3.   The limits for ΔV_F shall be defined by the Manufacturer on every lot in accordance with MIL-STD-750 Method 3101 and shall guarantee the $R_{th(j-c)}$ limits specified in Para. 1.5, Maximum Ratings.
4.   Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.

2.4   PARAMETER DRIFT VALUES
Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Para. 2.3.1, Room Temperature Electrical Measurements.

The drift values (Δ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits			Units
		Drift Value Δ	Absolute		
			Min	Max	
Forward Voltage 2	V_{F2}	±30	-	485	mV
Reverse Current	I_R	±25 or (1) ±100%	-	80	µA

NOTES:
1.   Whichever is the greater referred to the initial value.

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS
Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Para. 2.3.1, Room Temperature Electrical Measurements.

Characteristics	Symbols	Limits		Units
		Min	Max	
Forward Voltage 2	V_{F2}	-	485	mV
Reverse Current	I_R	-	80	µA

2.6 HIGH TEMPERATURE REVERSE BIAS BURN-IN CONDITIONS

Characteristics	Symbols	Limits	Units
Ambient Temperature	T_{amb}	+80 ±3	°C
Reverse Voltage	V_R	40 (Note 1)	V
Duration	t	96	hours

NOTES:
1. V_R = rectangular wave, f = 50Hz, duty cycle = 25%.

2.7 POWER BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+22 ±3	°C
Junction Temperature	T_j	+150 (+0 -5)	°C
Average Output Rectified Current	I_O	Note 1	A

NOTES:
1. The output current may be adjusted, within the given limit range, to attain the specified junction temperature.

2.8 OPERATING LIFE CONDITIONS
The conditions shall be as specified in Para. 2.7, Power Burn-in.

APPENDIX A

AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 2.1.1, Deviations from the Generic Specification: Para. 8, Test Methods and Procedures	For qualification and qualification maintenance, or procurement of qualified or unqualified components, the following replacement test method specifications shall be used instead of the following ESCC Basic Specifications: • No. 20400, Internal Visual Inspection: replaced by MIL-STD-750 Test Method 2078. • No. 20500, External Visual Inspection: replaced by MIL-STD-750 Test Method 2071. • No. 20900, Radiographic Inspection of Electronic Components: replaced by MIL-STD-750 Test Method 2076.
Para. 2.1.1, Deviations from the Generic Specification: Deviations from Production Control - Chart F2	Internal Visual Inspection. Wedge bonds equal to 1.1 wire diameters are acceptable for bonding with a V-Groove tool.
	Internal Visual Inspection. For CCP packages, the criteria specified for voids in the fillet and minimum die mounting material around the visible die perimeter for die mounting defects may be omitted providing that a radiographic inspection to verify the die-attach process is performed on a sample basis in accordance with STMicroelectronics control plans internal procedure as specified in the PID.
Para. 2.1.1, Deviations from the Generic Specification: Deviations from Screening Tests - Chart F3	Solderability is not applicable unless specifically stipulated in the Purchase Order.
Para. 2.3.1, Room Temperature Electrical Measurements	All AC characteristics (C) may be considered guaranteed but not tested if successful pilot lot testing has been performed in accordance with STMicroelectronics "Acceptation wafers" internal procedure as specified in the PID, which includes AC characteristic measurements per the Detail Specification. A summary of the pilot lot testing shall be provided if required by the Purchase Order.