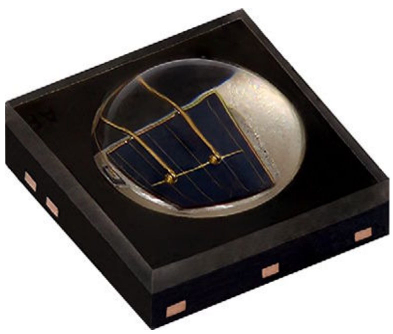
High Power Infrared Emitting Diode, 850 nm, Surface Emitter Technology



LINKS TO ADDITIONAL RESOURCES

Application Notes
3D Models

DESCRIPTION

As part of the Astral portfolio, the VSMA1085600X02 is an infrared, 850 nm emitting diode. It features a double stack emitter chip for highest radiant power. The 42 mil chip size allows 1.5 A DC operation and supports pulsed currents up to 5.0 A.

FEATURES

- Package type: surface-mount
- Package form: high power SMD with lens
- Dimensions (L x W x H in mm): 3.4 x 3.4 x 1.8
- Peak wavelength: λ_p = 850 nm
- AEC-Q102 qualified
- Angle of half intensity: φ = ± 60°
- Designed for high drive currents: up to 1.5 A (DC) and up to 5 A (pulsed)
- Low thermal resistance: 5 K/W < R_{thJSP} < 9 K/W
- ESD: up to 5 kV (according to ANSI / ESDA / JEDEC® JS-001)
- Floor life: 168 h, MSL 3, according to J-STD-020E
- Lead (Pb)-free reflow soldering
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE
Pb-free
e3
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

APPLICATIONS

- Driver and occupant monitoring
- Eye tracking
- Safety and security, CCTV

PRODUCT SUMMARY					
COMPONENT	I_e (mW/sr) at I_F = 1.0 A	φ (°)	λ_p (nm)	$\lambda_{centroid}$ (nm)	t_r (ns)
VSMA1085600X02	510	± 60	850	845	13

Note
- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VSMA1085600X02	Tape and reel	MOQ: 600 pcs, 600 pcs/reel	High power with lens

Note
- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Reverse voltage		V_R	5	V
Minimum forward current		$I_{F, min.}$	100	mA
Forward current		I_F	1.5	A
Surge forward current	t_p = 100 μs	I_{FSM}	5	A
Power dissipation		P_V	5.33	W
Junction temperature		T_j	145	°C
Ambient temperature range		T_{amb}	-40 to +125	°C
Storage temperature range		T_{stg}	-40 to +125	°C
Soldering temperature	According to Fig. 11, J-STD-020E	T_{sd}	260	°C
Thermal resistance junction to solder point real [1]	JESD 51	$R_{thJSP,real}$	5 to 9	K/W
Thermal resistance junction to ambient real	JESD 51	$R_{thJA,real}$	80	K/W
ESD sensitivity	According to ANSI / ESDA / JEDEC JS-001	V_{ESD}	5	kV

Note

[1] Thermal resistance junction to solder point real has been measured with the part mounted on an ideal heatsink and the optical output power has been deducted from the total electrical power dissipation

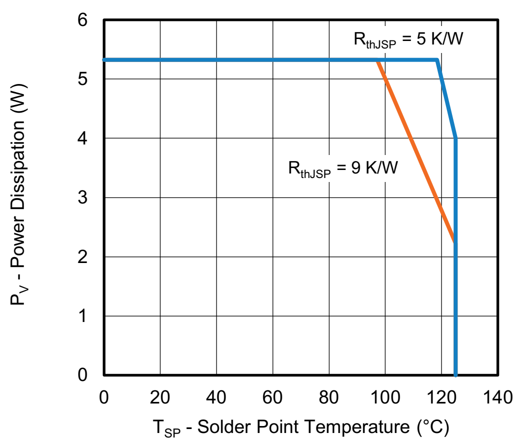


Fig. 1 - Power Dissipation Limit vs. Solder Point Temperature

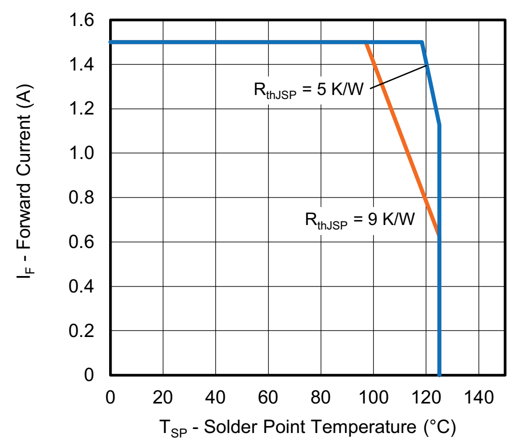


Fig. 2 - Forward Current Limit vs. Solder Point Temperature

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Forward voltage	I_F = 0.35 A, t_p = 10 ms	V_F	2.7	2.8	3.1	V
	I_F = 1 A, t_p = 100 μs	V_F	2.8	3.0	3.3	V
	I_F = 1.5 A, t_p = 100 μs	V_F	2.9	3.2	3.55	V
	I_F = 5 A, t_p = 100 μs	V_F	3.2	3.9	4.4	V
Temperature coefficient of V_F	I_F = 1 A, t_p = 100 μs		-	-2	-	mV/K
Reverse current [(1)]		I_R	Not designed for reverse operation			μA
Radiant intensity [(2)]	I_F = 0.35 A, t_p = 10 ms	I_e	130	190	235	mW/sr
	I_F = 1 A, t_p = 100 μs	I_e	360	510	630	mW/sr
	I_F = 1.5 A, t_p = 100 μs	I_e	535	750	950	mW/sr
	I_F = 5 A, t_p = 100 μs	I_e	1620	2300	2850	mW/sr
Radiant power	I_F = 1 A, t_p = 100 μs	ϕ_e	-	1450	-	mW
	I_F = 1.5 A, t_p = 100 μs	ϕ_e	-	2125	-	mW
Temperature coefficient of ϕ	I_F = 1 A, t_p = 100 μs	TK_ϕ	-	-0.15	-	%/K
Angle of half intensity		φ	-	± 60	-	°
Peak wavelength	I_F = 1 A, t_p = 100 μs	λ_p	-	850	-	nm
Centroid wavelength	I_F = 1 A, t_p = 100 μs	$\lambda_{centroid}$	-	845	-	nm
Spectral bandwidth	I_F = 1 A, t_p = 100 μs	$\Delta\lambda$	-	30	-	nm
Temperature coefficient of λ_p	I_F = 100 mA, t_p = 20 ms	$TK_{\lambda p}$	-	0.25	-	nm/K
Rise time	I_F = 1 A, R_L = 50 Ω	t_r	-	13	-	ns
Fall time	I_F = 1 A, R_L = 50 Ω	t_f	-	16	-	ns

Notes

(1) This infrared LED is designed to be operated within the specified forward current range. Continuous reverse operation must be avoided because it may damage the infrared LED.

(2) The radiant intensity values have been measured with a tolerance of ± 11 %

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

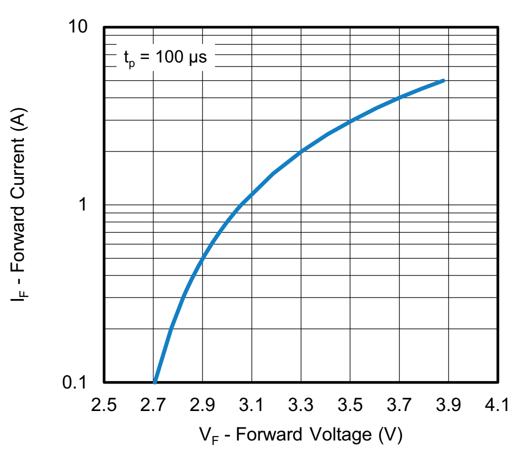


Fig. 3 - Forward Current vs. Forward Voltage

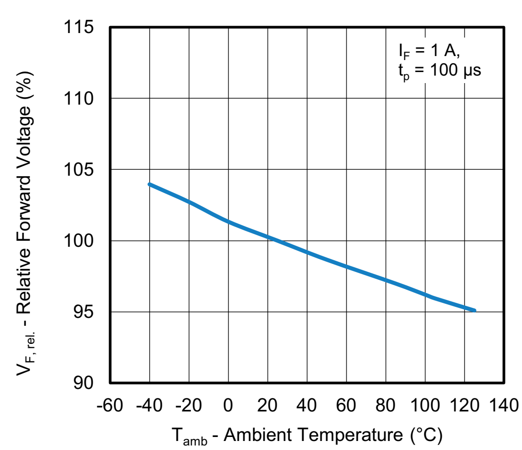


Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

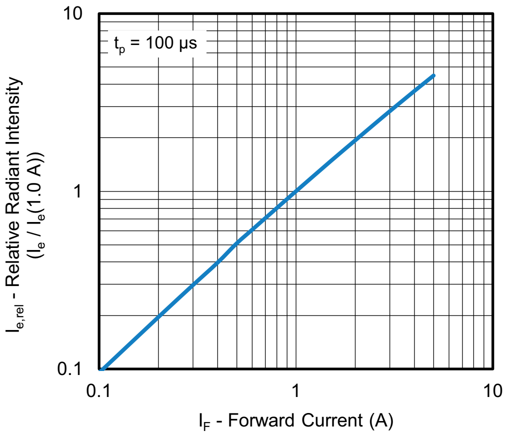


Fig. 5 - Relative Radiant Intensity vs. Forward Current

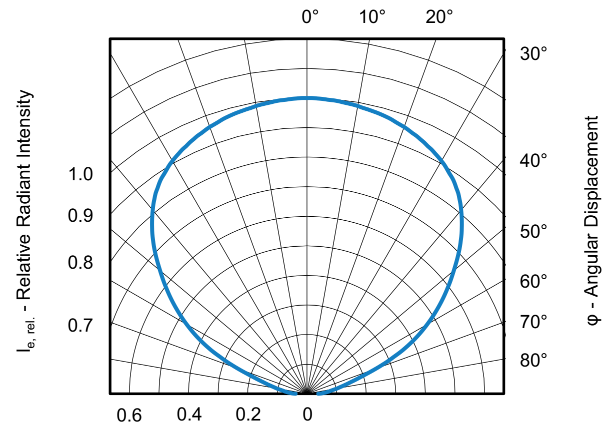


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement

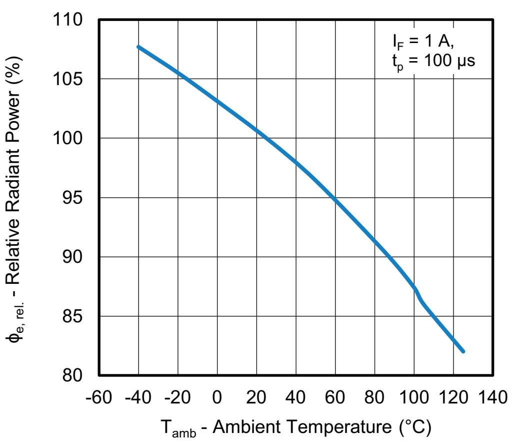


Fig. 6 - Relative Radiant Power vs. Ambient Temperature

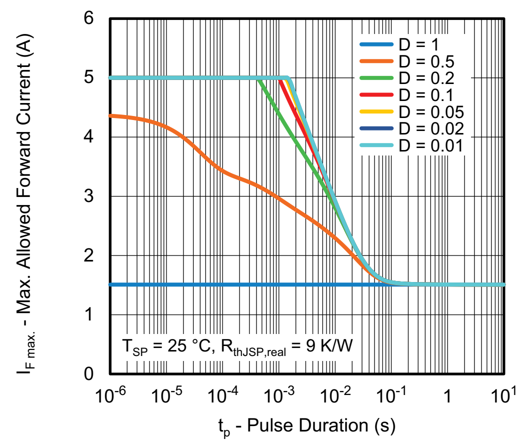


Fig. 9 - Max. Allowed Forward Current vs. Pulse Duration

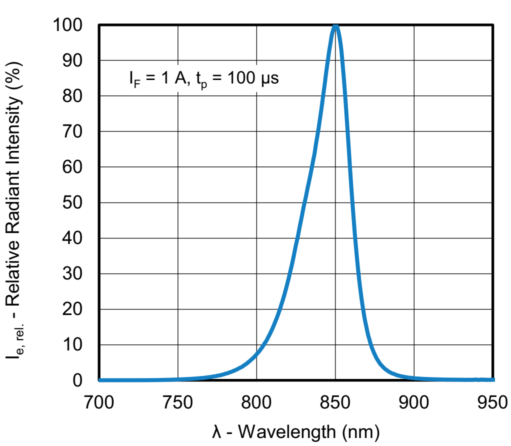


Fig. 7 - Relative Radiant Intensity vs. Wavelength

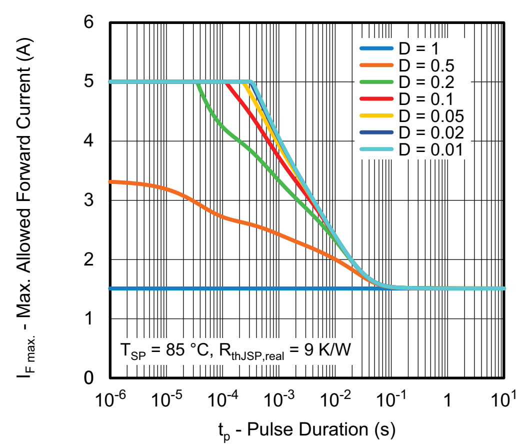
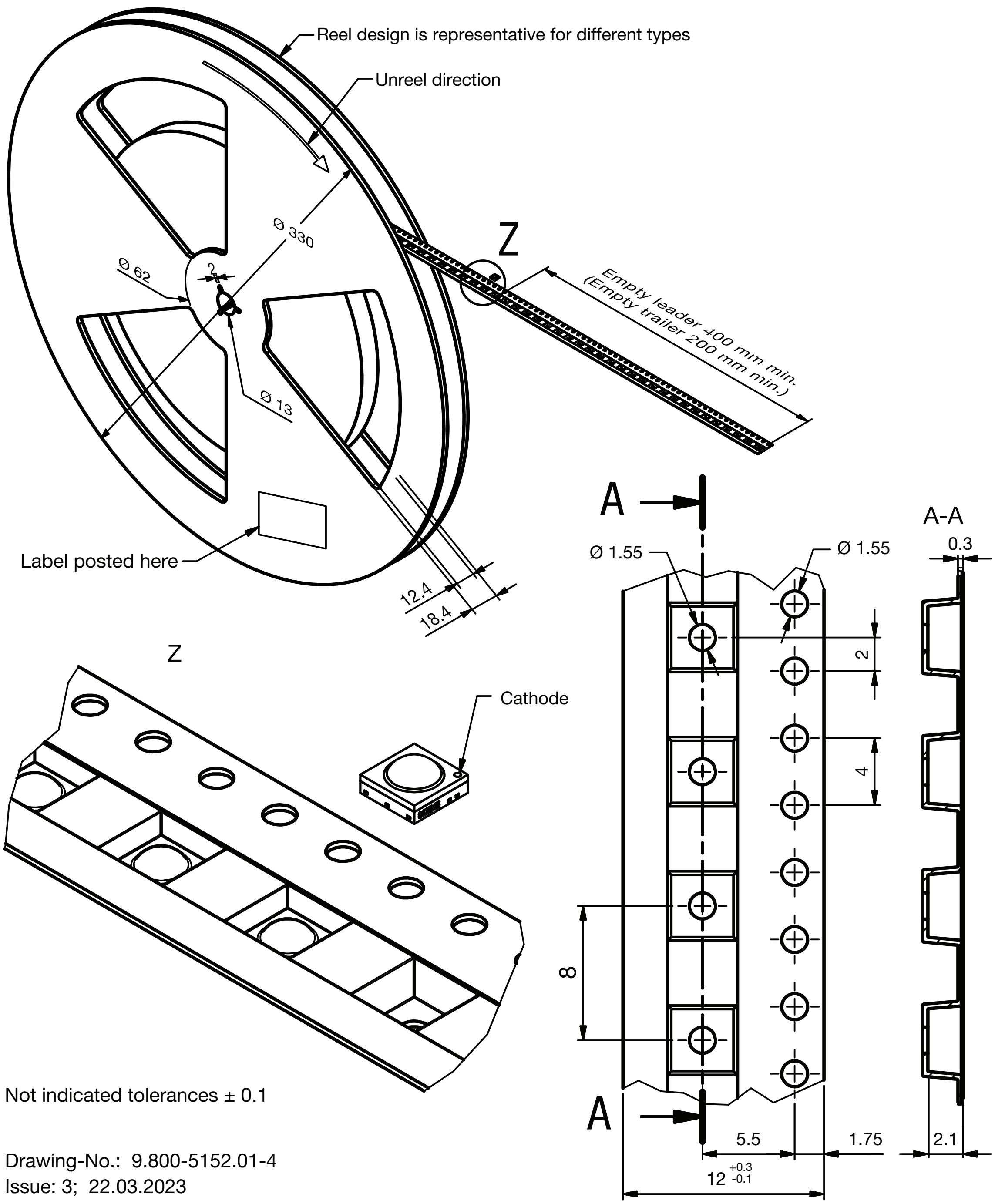


Fig. 10 - Max. Allowed Forward Current vs. Pulse Duration

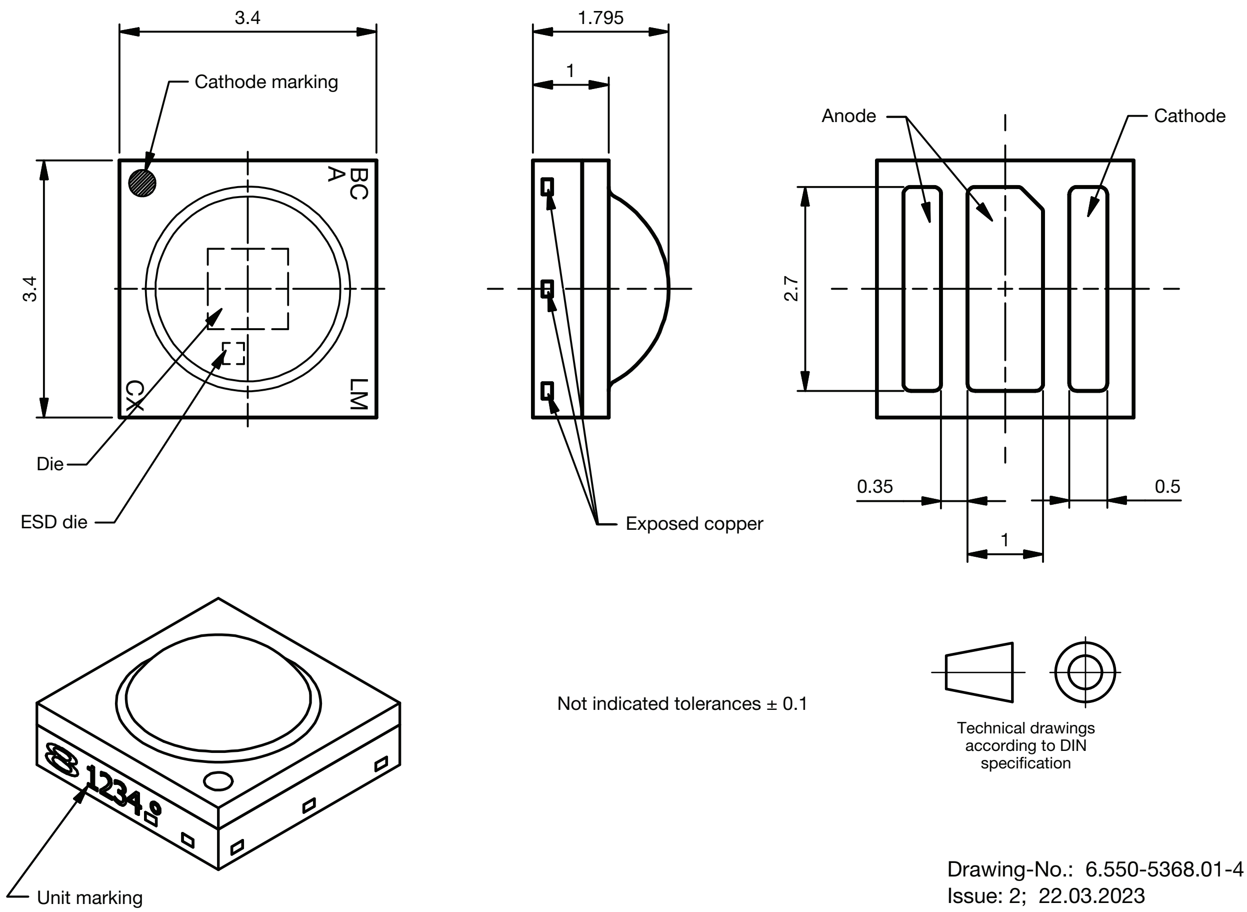
TAPING DIMENSIONS in millimeters



Notes

- Empty component pockets sealed with top cover tape
- 7 inch reel - 600 pieces per reel
- The maximum number of consecutive missing lamps is two
- In accordance with ANSI / EIA 481-1-A-1994 specifications

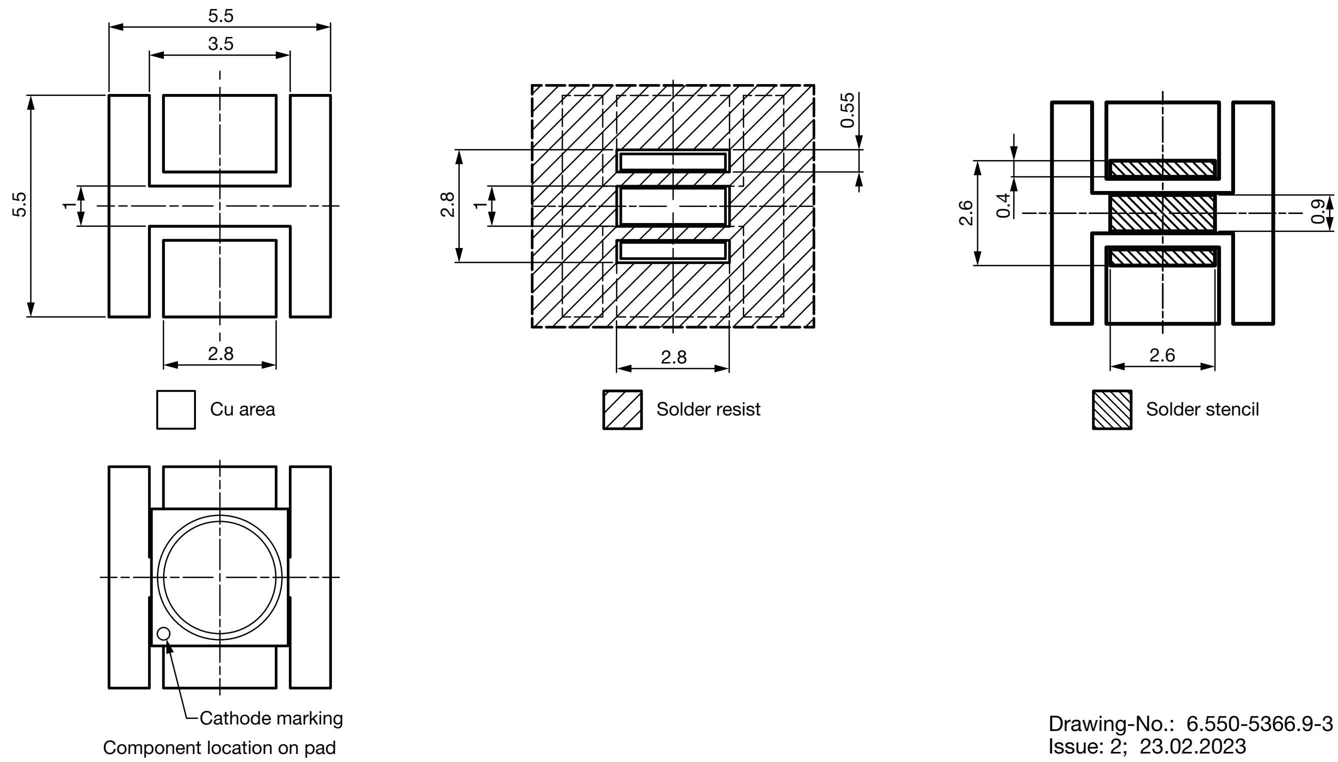
PACKAGE DIMENSIONS in millimeters



Notes

- Tolerance is ± 0.10 mm (0.004") unless otherwise noted
- Specifications are subject to change without notice

RECOMMENDED FOOTPRINT



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SOLDER PROFILE

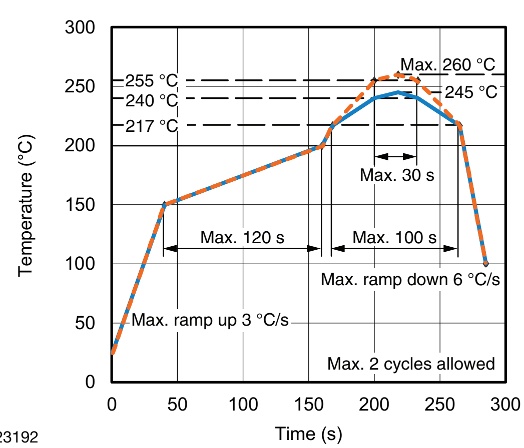

Fig. 11 - Lead (Pb)-free (Sn) Infrared Reflow Solder Profile According to J-STD-020E for Surface-Mount Components

DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

FLOOR LIFE

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 168 h

Conditions: T_{amb} < 30 °C, RH < 60 %

Moisture sensitivity level 3, according to J-STD-020E

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-033D or label. Devices taped on reel dry using recommended conditions 192 h at 40 °C (+ 5 °C), RH < 5 %.

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