
3A Gate Drive Photocoupler

Product Description

The EPC3341 series photocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications and inverters in power supply systems. It contains an LED optically coupled to an integrated circuit with a power output stage.

The 3.0 A peak output current is capable of directly driving most IGBTs with ratings up to 1200 V/50 A. For IGBTs with higher voltage or current ratings, the EPC3341 series can be used to drive a discrete power stage, which in turn drives the IGBT gate.

The photocoupler operational parameters are guaranteed over the temperature range from -40°C to +110°C.

Features

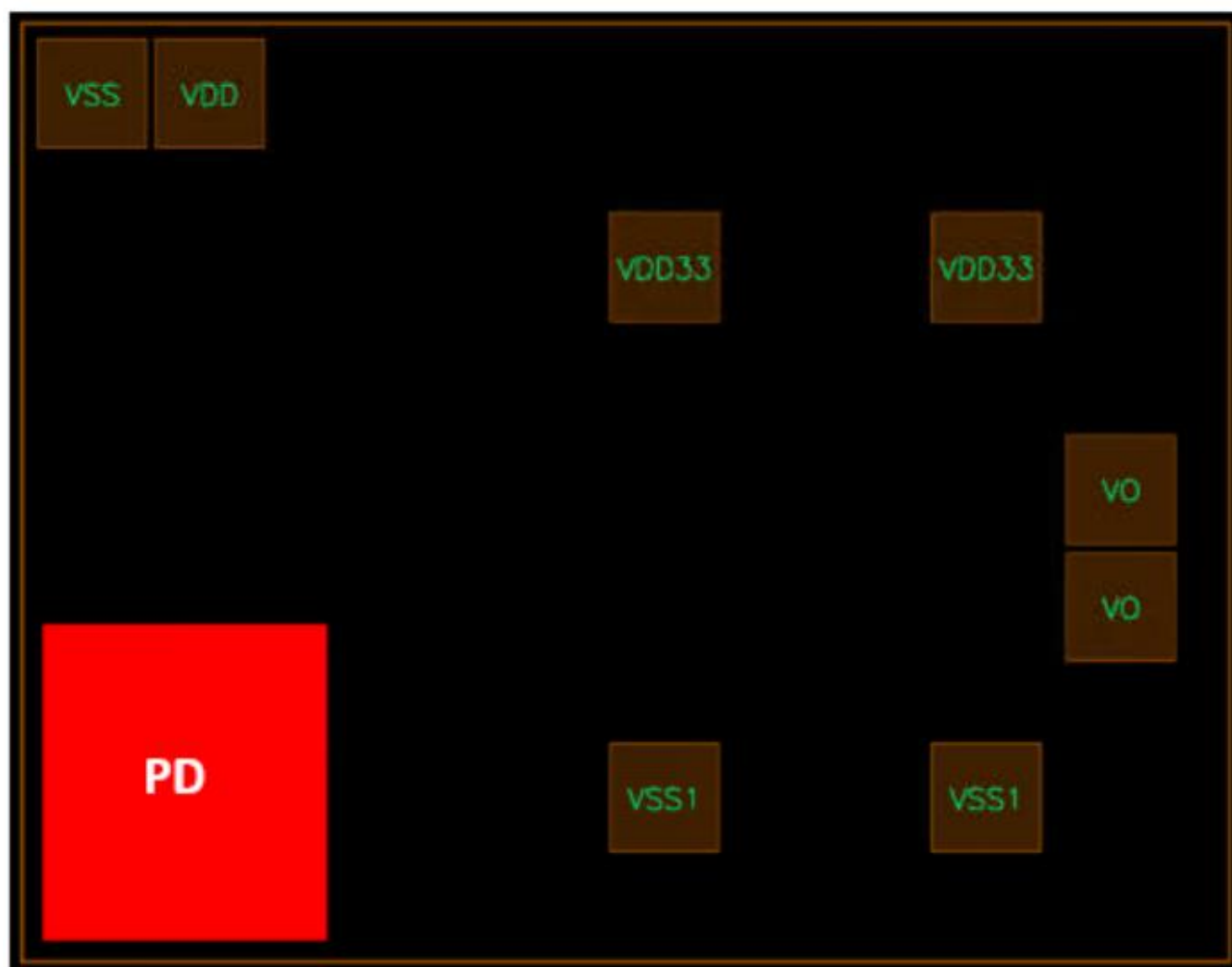
- 3.0 A maximum peak output current
- 3.0 A minimum guaranteed output current (IOH, IOL)
- Rail-to-rail output voltage
- 120 ns maximum propagation delay
- Under Voltage Lock-Out protection (UVLO) with hysteresis
- Wide operating VCC range: 15 to 30 Volts
- Guaranteed performance over temperature -40°C ~ +110°C

Applications

- IGBT / MOSFET gate drive
- Photovoltaic (PV) power conditioning systems
- Industrial inverters
- Uninterruptible power supply (UPS)
- AC servo and DC brushless motor drives
- Switching power supplies
- Induction cook-top

Die Information

Name	X-axis	Y-axis	W	H
VDD	191	880	110	110
VSS	72	880	110	110
VSS1	651	167	110	110
VSS1	977	167	110	110
VO	1113	360	110	110
VO	1113	479	110	110
VDD33	977	704	110	110
VDD33	651	704	110	110
PD	165.83	182.45	286.34	319.58



Truth Table

LED	VCC-VSS (Turn-ON)	VCC-VSS (Turn-OFF)	VO
OFF	0 - 30 V	0 - 30 V	Low
ON	0 - 11.0 V	0 - 9.5 V	Low
ON	11.0 - 13.5 V	9.5 - 12 V	Transition
ON	13.5 - 30 V	12 - 30 V	High

Note 1: A 0.1 μ F bypass capacitor must be connected between VCC and VSS.

Absolute Maximum Ratings (Ta = 25°C unless otherwise specified)

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Tstg	-55	125	°C
Operating Temperature	Topr	-40	125	°C
Output IC Junction Temperature	TJ	-	135	°C
Total Output Supply Voltage	(VCC - VSS)	0	30	V
Average Forward Input Current	IF	-	20	mA
Reverse Input Voltage	VR	-	5	V
"High" Peak Output Current (Note 3)	IOH(PEAK)	-	4.0	A
"Low" Peak Output Current (Note 3)	IOL(PEAK)	-	4.0	A
Output Voltage	VO(PEAK)	0	VCC	V
Input Power Dissipation	PI	-	45	mW
Output IC Power Dissipation	PO	-	700	mW
Lead Solder Temperature	Tsol	-	260	°C

Note 2: Ambient temperature = 25°C, unless otherwise specified. Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Note 3: Exponential waveform. Pulse width $\leq 10 \mu$ s, $f \leq 15$ kHz

Recommended Operation Condition

Parameter	Symbol	Min	Max	Unit
Operating Temperature	TA	-40	125	°C
Supply Voltage	VCC	15	30	V
Input Current (ON)	IF(ON)	5	16	mA
Input Voltage (OFF)	VF(OFF)	0	0.8	V

IEC/EN/DIN EN 60747-5-5 Insulation Characteristics

Description	Symbol	EPC3341-SK	Unit
Climatic Classification	-	55/100/21	-
Pollution Degree (DIN VDE 0110/1.89)	-	2	-
Maximum Working Insulation Voltage	VIORM	TBD	Vpeak
Input to Output Test Voltage, Method a VIORM × 1.875 = VPR, 100% Production Test, tm=10sec, Partial discharge < 5pC	VPR	TBD	Vpeak
Highest Allowable Overvoltage (Transient Overvoltage tini = 60sec)	VIOTM	TBD	Vpeak
Safety-limiting values – maximum values allowed in the event of a failure			
Case Temperature	Ts	175	°C
Input Current	IS,INPUT	TBD	mA
Output Power	PS,OUTPUT	TBD	mW
Insulation Resistance at TS, VIO = 500V	RS	TBD	Ω

Note 4: Refer to the optocoupler section of the Isolation and Control Components Designer's Catalog, under Product Safety Regulations section (IEC/EN/DIN EN 60747-5-5), for a detailed description of Method a and Method b partial discharge test profiles. These optocouplers are suitable for "safe electrical isolation" only within the safety limit data. Maintenance of the safety data shall be ensured by means of protective circuits. Surface mount classification is Class A per CECC 00802.

Insulation and Safety-Related Specifications

Parameter	Symbol	EPC3341-SK	Unit	Conditions
Minimum External Air Gap (External Clearance)	L(101)	7.0	mm	Measured from input terminals to output terminals, shortest distance through air.
Minimum External Tracking (External Creepage)	L(102)	8.0	mm	Measured from input terminals to output terminals, shortest distance path along body.
Tracking Resistance (Comparative Tracking Index)	CTI	>175	V	DIN IEC 112/VDE 0303 Part 1.

Electrical Characteristics

All typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{SS} = 30\text{ V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Input Characteristics						
Input Forward Voltage	VF	1.6	1.9	2.4	V	IF = 10 mA
Input Forward Voltage Temperature Coefficient	$\Delta V_F / \Delta T$	-	-1.24	-	mV/°C	IF = 10 mA
Input Reverse Current	IR	-	-	10	μA	VR = 10 V
Input Threshold Current (Low to High)	IFLH	-	0.9	2	mA	VO > 5V, IO = 0A
Input Threshold Voltage (High to Low)	VFHL	0.8	-	-	V	VCC = 30V, VO < 5V
Input Capacitance	CIN	-	60	-	pF	f = 1 MHz, VF = 0V
Output Characteristics						
High Level Supply Current	ICCH	-	2.0	3	mA	IF = 10 mA, VCC = 30V, VO = Open
Low Level Supply Current	ICCL	-	2.3	3	mA	IF = 0 mA, VCC = 30V, VO = Open
High Level Output Current (Note 5) IF = 10 mA, VCC = 30V	IOH		-1-	-	A	V OH = (V DD - 1V)
			-3		A	V OH = (V DD - 6V)
			-4		A	V OH = (V DD - 15V)
Low Level Output Current (Note 5) IF = 0 mA, VCC = 30V	IOL		1-	-	A	V OL = (V SS + 1V)
			3		A	V OL = (V SS + 6V)
			4		A	V OL = (V SS + 15V)
High Level Output Voltage (Note 6, 7)	VOH	29.7	29.9	-	V	IF = 10 mA, IO = -100 mA
Low Level Output Voltage (Note 7)	VOL	-	0.1	0.3	V	IF = 0 mA, IO = 100 mA
UVLO Threshold(V1=C1)	VUVLO+		8.1		V	VO > 5V, IF = 10 mA
	VUVLO-		7.3		V	VO < 5V, IF = 10 mA
UVLO Threshold (V2=C5)	VUVLO+		10.9		V	VO > 5V, IF = 10 mA
	VUVLO-		11.9		V	VO < 5V, IF = 10 mA

Note 5: Maximum pulse width = 10 μs.

Note 6: In this test VOH is measured with a DC load current. When driving capacitive loads, VOH will approach VCC as IOH approaches zero amps.

Note 7: Maximum pulse width = 1 ms.

Switching Specification

All typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{SS} = 30\text{ V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Propagation Delay Time to Low Output Level	tPLH	70	87	110	ns	Rg = 10Ω, Cg = 25 nF, f = 25 kHz, Duty Cycle = 50%, IF = 10 mA, VCC = 30V
Propagation Delay Time to High Output Level	tPHL	70	87	110	ns	(same test condition as above)
Pulse Width Distortion (PWD = tPHL - tPLH)	PWD	-20	0	20	ns	(same test condition as above)
Propagation Delay Difference	PDD	-40	-	+40	ns	(same test condition as above)

Between Any Two Parts						
Output Rise Time (10 to 85%)	tr	-	18.2	-	ns	(same test condition as above)
Output Fall Time (90 to 10%)	tf	-	12	-	ns	(same test condition as above)

Note 8: Pin 2 needs to be connected to LED common.

Note 9: Common mode transient immunity (CMTI) in the high state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in the high state (meaning $V_O > 15.0V$).

Note 10: Common mode transient immunity (CMTI) in the low state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in a low state (meaning $V_O < 1.0V$).

Test Circuits

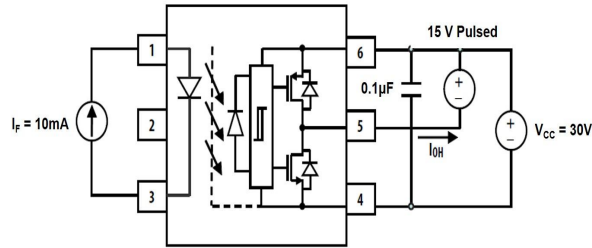


Fig.14 IOH Test Circuit

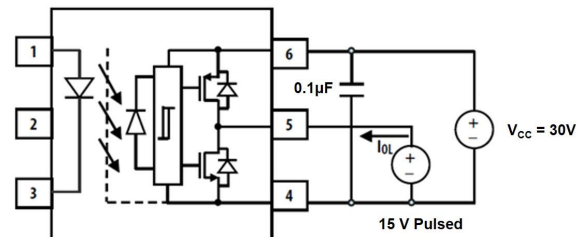


Fig.15 IOL Test Circuit

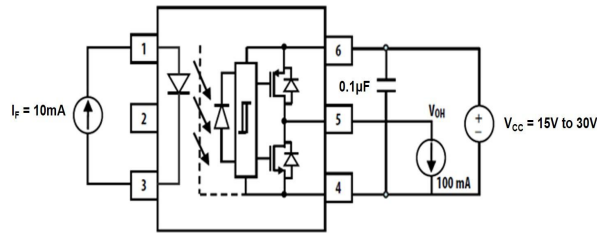


Fig.16 VOH Test Circuit

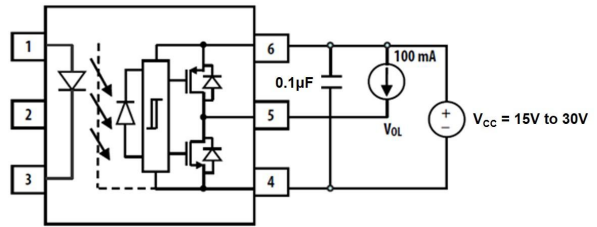


Fig.17 VOL Test Circuit

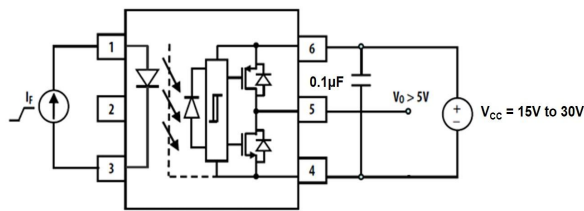


Fig.18 IFLH Test Circuit

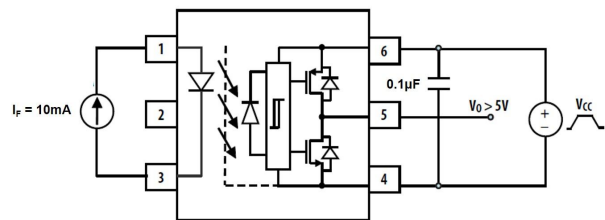


Fig.19 UVLO Test Circuit

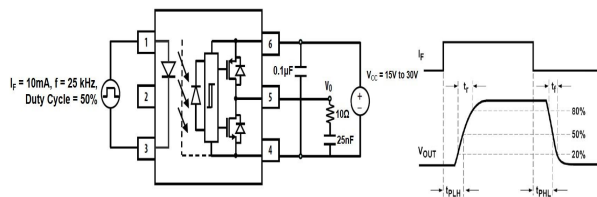


Fig.20 tPHL, tPLH, tr and tf Test Circuit and Waveforms

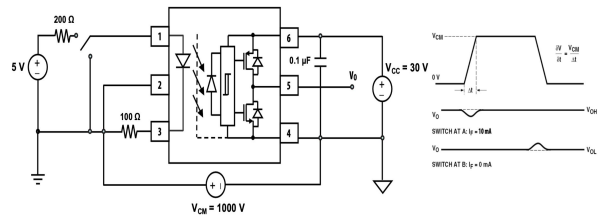
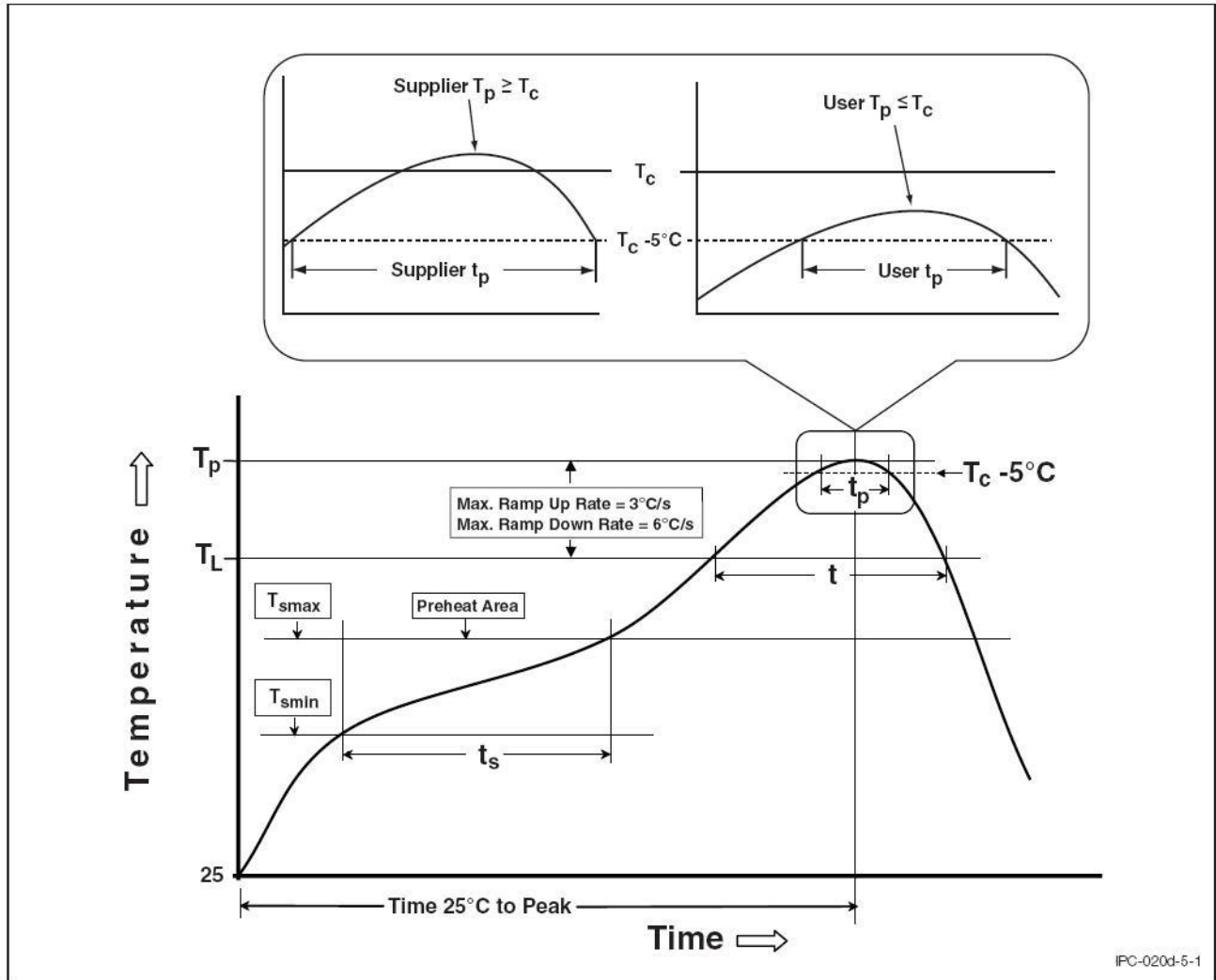


Fig.21 CMR Test Circuit with Split Resistors Network and Waveforms

Reflow / Soldering Information

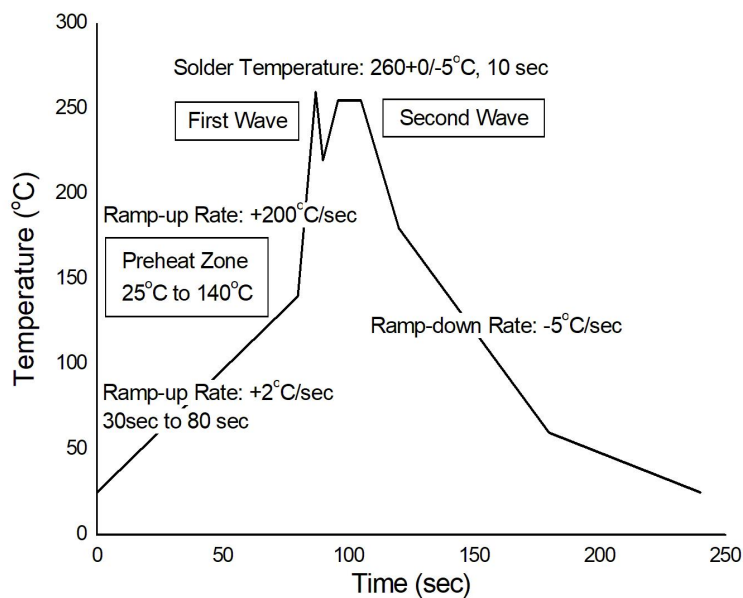
Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100°C	150°C
Temperature Max. (T_{smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax}	60-120 seconds	60-120 seconds
Ramp-up Rate (t_L to t_P)	$3^\circ\text{C/second max.}$	$3^\circ\text{C/second max.}$
Liquidous Temperature (T_L)	183°C	217°C
Time (t_L) Maintained Above T_L	60-150 seconds	60-150 seconds
Peak Body Package Temperature	$235^\circ\text{C} + 0^\circ\text{C}/-5^\circ\text{C}$	$260^\circ\text{C} + 0^\circ\text{C}/-5^\circ\text{C}$
Time (t_P) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T_P to T_L)	$6^\circ\text{C/second max}$	$6^\circ\text{C/second max}$
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Temperature Profile of Soldering

Wave Soldering (JESD22-A111 Compliant)



Hand Soldering by Soldering Iron	
Soldering Temperature	380 +0/-5°C
Soldering Time	3 sec max.

One-time soldering is recommended for all soldering methods. Do not solder more than three times for IR reflow soldering.

Immersing the unit's body in solder paste is not recommended.

Discoloration may occur on the package surface after soldering, reflow, or prolonged use. This has no impact on product performance or reliability.

Revision History

Revision	Date	Description
0.1	2026.09.07	Preliminary version

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