Data Sheet

RV1S9991A / RV1S9992A

4 A OUTPUT CURRENT, HIGH CMTI
IGBT, GaN FET, SiC FET and Si power MOSFET gate drive
15 mm LONG CREEPAGE DISTANCE (LSDIP8) PHOTOCOUPLER

R08DS0323EJ0100
Rev.1.0
Dec. 11, 2025

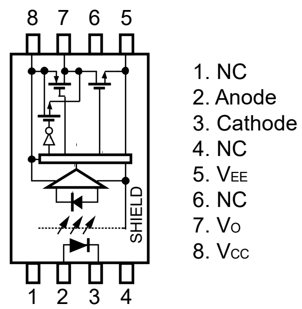
DESCRIPTION

The RV1S9991A / RV1S9992A are optically coupled isolators containing an AlGaAs LED on the input side and a photodiode with a signal processing circuit and power MOSFETs built in one chip on the output side. The RV1S9991A / RV1S9992A are designed specifically for high common mode transient immunity (CMTI), high speed switching and high temperature operation up to T_A = 125 °C. They are suitable for driving IGBT, GaN FET, SiC FET and Si power MOSFET gate drive.

FEATURES

- Product portfolio with two different UVLO (Under Voltage Lock Out) characteristics
  RV1S9991A: V_{UVLO} = 9.6 V MAX.
  RV1S9992A: V_{UVLO} = 13.4 V MAX.
- Long creepage distance (15 mm MIN., LSDIP8)
- Peak output current (4 A MAX.)
- High speed switching (t_{PLH}, t_{PHL} = 95 ns MAX.)
- Pulse width distortion ($|t_{PLH}$ - $t_{PHL}|$ = 35 ns MAX.)
- High common mode transient immunity ($|CM_H|$, $|CM_L|$ = 100 kV/μs MIN.)
- Operating ambient temperature (125 °C MAX.)
- High isolation voltage (BV = 7 500 Vr.m.s.)
- Embossed tape product:
  RV1S9991ACCSP-10Yx#KC0: 1 000 pcs/reel
  RV1S9992ACCSP-10Yx#KC0: 1 000 pcs/reel
- Pb-free product
  Safety standard
  • UL : UL1577, Double protection
  •VDE : DIN EN IEC 60747-5-5, DIN EN IEC 62368-1, Reinforced insulation (Option)

PIN CONNECTION
(Top View)

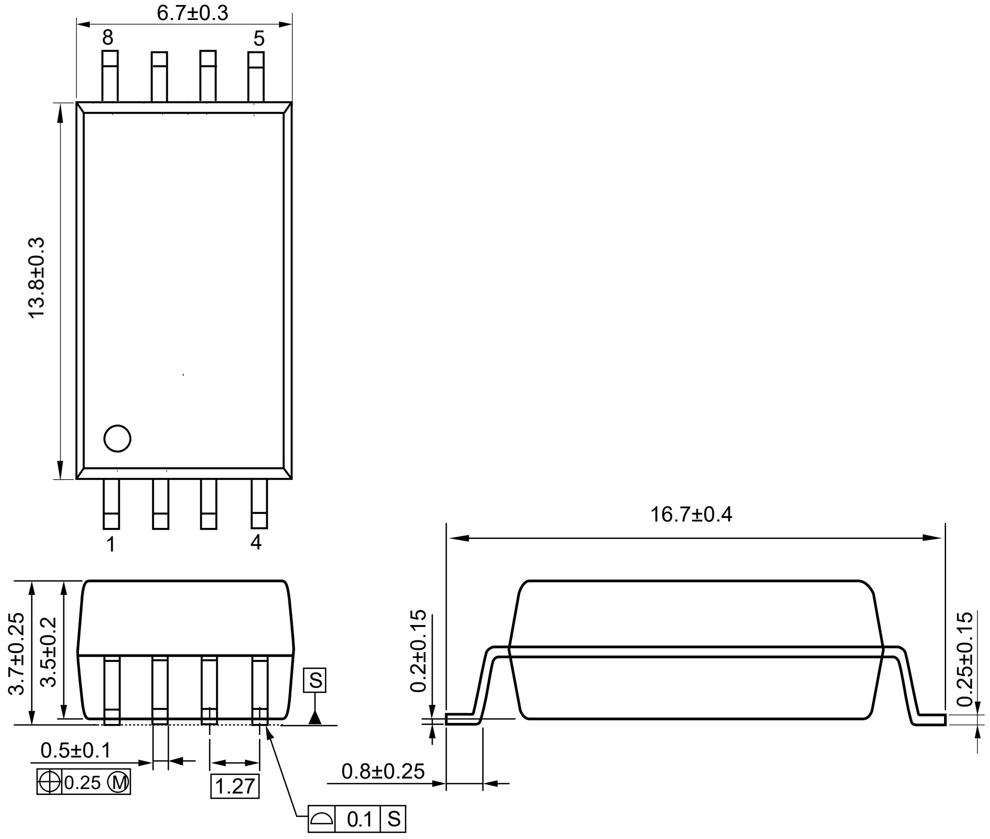


APPLICATIONS

- IGBT, GaN FET, SiC FET and Si power MOSFET gate drive
- Industrial inverter / AC Servo
- Solar and wind Power Conditioner

Start of mass production
Dec. 2025

PACKAGE DIMENSIONS (UNIT: mm)

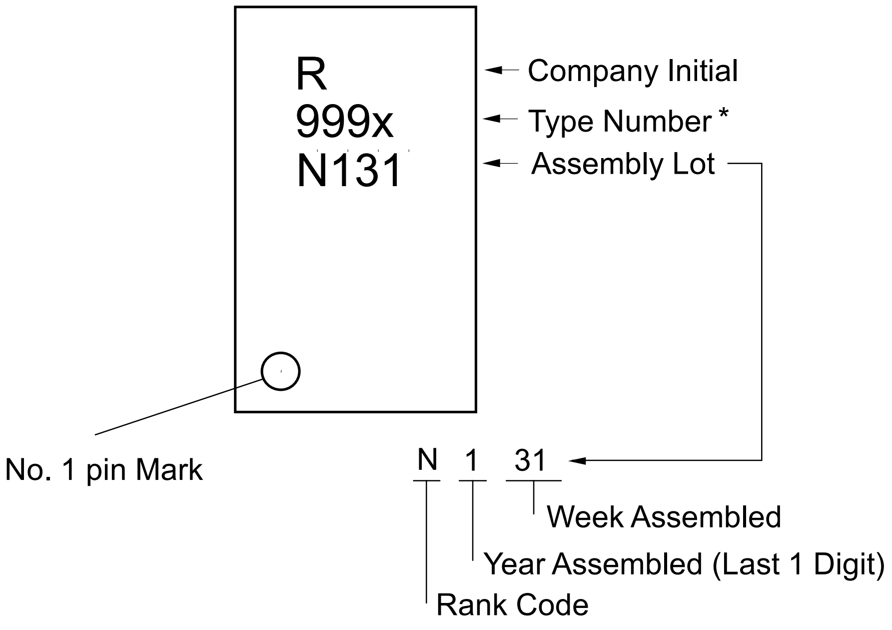


Weight: 0.642 g (TYP.)

PHOTOCOUPLER CONSTRUCTION

Parameter	MIN.
Air Distance	14.5 mm
Creepage Distance	15 mm
Isolation Distance	0.4 mm

MARKING EXAMPLE



*) Applicable type numbers are listed below.

RV1S9991ACCSP-10Yx

RV1S9992ACCSP-10Yx

Marking type number. "RV1S" and "ACCSP-10Yx" are omitted from original type number.

ORDERING INFORMATION

Part Number	Order Number	Solder Plating Specification	Packing Style	Safety Standard Approval	Application Part Number *1
RV1S9991ACCSP -10YC	RV1S9991ACCSP -10YC#SC0	Pb-Free and Halogen Free (Ni/Pd/Au)	Embossed Tape 10 pcs	UL Approved	RV1S9991A
	RV1S9991ACCSP -10YC#KC0		Embossed Tape 1 000 pcs/reel		
RV1S9991ACCSP -10YV	RV1S9991ACCSP -10YV#SC0		Embossed Tape 10 pcs	UL, VDE Approved	
	RV1S9991ACCSP -10YV#KC0		Embossed Tape 1 000 pcs/reel		
RV1S9992ACCSP -10YC	RV1S9992ACCSP -10YC#SC0		Embossed Tape 10 pcs	UL Approved	RV1S9992A
	RV1S9992ACCSP -10YC#KC0		Embossed Tape 1 000 pcs/reel		
RV1S9992ACCSP -10YV	RV1S9992ACCSP -10YV#SC0		Embossed Tape 10 pcs	UL, VDE Approved	
	RV1S9992ACCSP -10YV#KC0		Embossed Tape 1 000 pcs/reel		

Notes:*1. For the application of the safety standard, the following part number should be used.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	25	mA
	Peak Transient Forward Current (Pulse Width < 1μs)	$I_{F\ (TRAN)}$	1	A
	Reverse Voltage	V_R	5	V
	Power Dissipation *1	P_D	45	mW
Detector	High Level Peak Output Current *2	$I_{OH\ (PEAK)}$	4	A
	Low Level Peak Output Current *2	$I_{OL\ (PEAK)}$	4	A
	Supply Voltage	$(V_{CC} - V_{EE})$	−0.3 to 35	V
	Output Voltage	V_O	0 to V_{CC}	V
	Power Dissipation *3	P_C	250	mW
Isolation Voltage *4		BV	7 500	Vr.m.s.
Operating Ambient Temperature		T_A	−40 to +125	°C
Storage Temperature		T_{stg}	−40 to +150	°C

Notes: *1. Reduced at a rate of 1.2 mW/°C above T_A = 110 °C.
*2. Maximum pulse width = 10 μs, Maximum duty cycle = 0.2 %.
*3. Reduced at a rate of 2.8 mW/°C above T_A = 90 °C.
*4. AC voltage for 1 minute at T_A = 25 °C, RH = 60% between input and output.
Pins 1-2 shorted together, 3-5 shorted together.

RECOMMENDED OPERATING CONDITIONS

Parameter		Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	RV1S9991A	$(V_{CC} - V_{EE})$	10		30	V
	RV1S9992A		15		30	
Forward Current (ON)		$I_{F\ (ON)}$	12	14	16	mA
Forward Voltage (OFF)		$V_{F\ (OFF)}$	−2		0.8	V
Operating Ambient Temperature		T_A	−40		+125	°C

ELECTRICAL CHARACTERISTICS
(at recommended operating conditions, V_{EE} = GND, unless otherwise specified)

Parameter			Symbol	Conditions	MIN.	TYP.[*1]	MAX.	Unit
Diode	Forward Voltage		V_F	I_F = 14 mA, T_A = 25 °C	1.4	1.6	1.8	V
	Reverse Current		I_R	V_R = 3 V, T_A = 25 °C			10	μA
	Input Capacitance		C_t	V_F = 0 V, f = 1 MHz, T_A = 25 °C		30		pF
Detector	High Level Output Current		I_{OH}	V_O = (V_{CC} − 4 V) [*2, *5]		−2.8	−1.0	A
				V_O = (V_{CC} − 10 V) [*3, *5]			−3.6	
	Low Level Output Current		I_{OL}	V_O = (V_{EE} + 2.5 V) [*2, *5]	1.0	2.5		A
				V_O = (V_{EE} + 10 V) [*3, *5]	3.6			
	High Level Output Voltage		V_{OH}	I_O = −30 mA [*4]	V_{CC} − 0.3	V_{CC} − 0.1		V
	Low Level Output Voltage		V_{OL}	I_O = 100 mA		0.1	0.2	V
	High Level Supply Current		I_{CCH}	V_O = Open, I_F = 14 mA [*5]		2.6	4.0	mA
	Low Level Supply Current		I_{CCL}	V_O = Open, V_F = 0 to 0.8 V [*5]		2.9	4.0	mA
	RV1S9991A	UVLO Threshold	V_{UVLO+}	V_O > 5 V, I_F = 14 mA	7.6	8.6	9.6	V
			V_{UVLO-}		6.6	7.6	8.6	V
		UVLO Hysteresis	$UVLO_{HYS}$		0.3	1.0		V
	RV1S9992A	UVLO Threshold	V_{UVLO+}	V_O > 5 V, I_F = 14 mA	10.8	12.0	13.4	V
			V_{UVLO-}		9.5	11.0	12.5	V
		UVLO Hysteresis	$UVLO_{HYS}$		0.4	1.0		V
Coupled	Threshold Input Current (L → H)		I_{FLH}	I_O = 0 mA, V_O > 5 V [*5]		3.0	8.0	mA
	Threshold Input Voltage (H → L)		V_{FHL}	I_O = 0 mA, V_O < 5 V	0.8			V

Notes: *1. Typical values at T_A = 25 °C, V_{CC} − V_{EE} = 30 V

*2. Maximum pulse width = 50 μs, Maximum duty cycle = 0.5 %.

*3. Maximum pulse width = 10 μs, Maximum duty cycle = 0.2 %.

*4. V_{OH} is measured with the DC load current in this testing (Maximum pulse width = 2 ms, Maximum duty cycle = 20%).

*5. The polarity of the current flowing from the external circuit to the RV1S9991A / RV1S9992A is positive.

SWITCHING CHARACTERISTICS
(at recommended operating conditions, V_{EE} = GND, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Propagation Delay Time (L → H)	t_{PLH}	R_g = 10 Ω, C_g = 10 nF, f = 10 kHz, Duty Cycle = 50 %, I_F = 14 mA, C_{IN} = 60 pF, R_{IN} = 240 Ω		42	95	ns
Propagation Delay Time (H → L)	t_{PHL}			39	95	ns
Pulse Width Distortion	PWD = $\lvert t_{PHL} - t_{PLH} \rvert$			3	35	ns
Propagation Delay Difference Between Any Two Parts	PDD = $t_{PHL} - t_{PLH}$		−35		35	ns
Rise Time	t_r			10		ns
Fall Time	t_f			10		ns
Common Mode Transient Immunity at High Level Output	$\lvert CM_H \rvert$	T_A = 25 °C, I_F = 14 mA, V_{CC} = 30 V, $V_{O (MIN.)}$ = 26 V, V_{CM} = 1.5 kV	100			kV/μs
Common Mode Transient Immunity at Low Level Output	$\lvert CM_L \rvert$	T_A = 25 °C, I_F = 0 mA, V_{CC} = 30 V, $V_{O (MAX.)}$ = 1 V, V_{CM} = 1.5 kV	100			kV/μs

Notes: *1. Typical values at T_A = 25 °C, $V_{CC} - V_{EE}$ = 30 V

TEST CIRCUIT

Fig. 1 I_{OH} Test Circuit

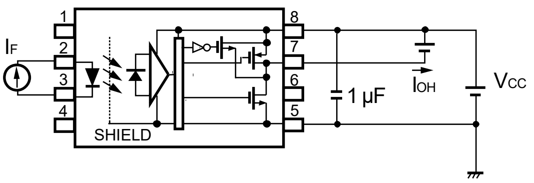


Fig. 2 I_{OL} Test Circuit

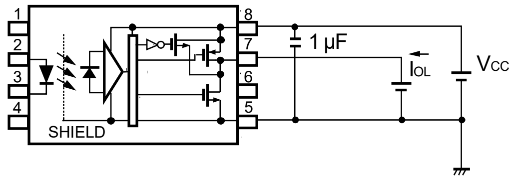


Fig. 3 V_{OH} Test Circuit

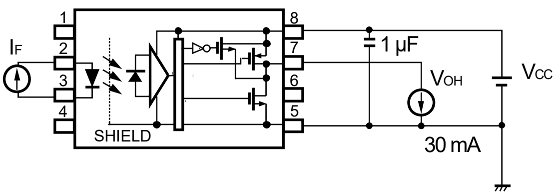


Fig. 4 V_{OL} Test Circuit

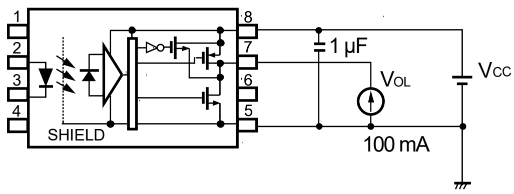


Fig. 5 I_{CCH} Test Circuit

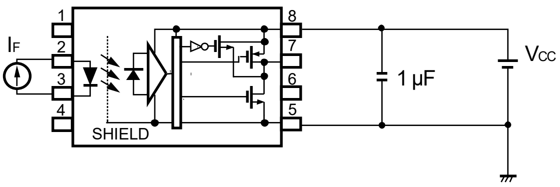


Fig. 6 I_{CCL} Test Circuit

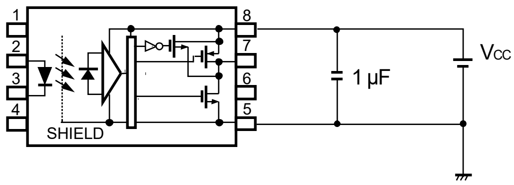


Fig. 7 V_{UVLO} Test Circuit

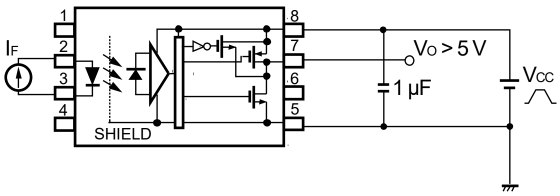


Fig. 8 I_{FLH} Test Circuit

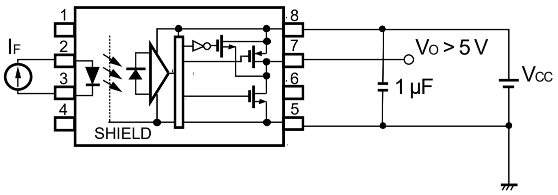


Fig. 9 t_{PLH}, t_{PHL}, t_r, t_f Test Circuit and Wave Forms

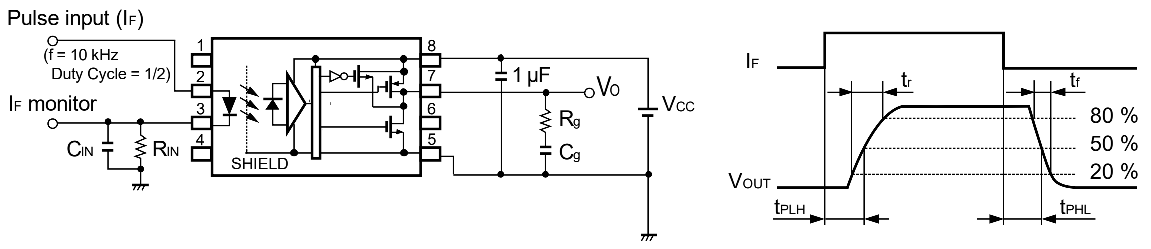
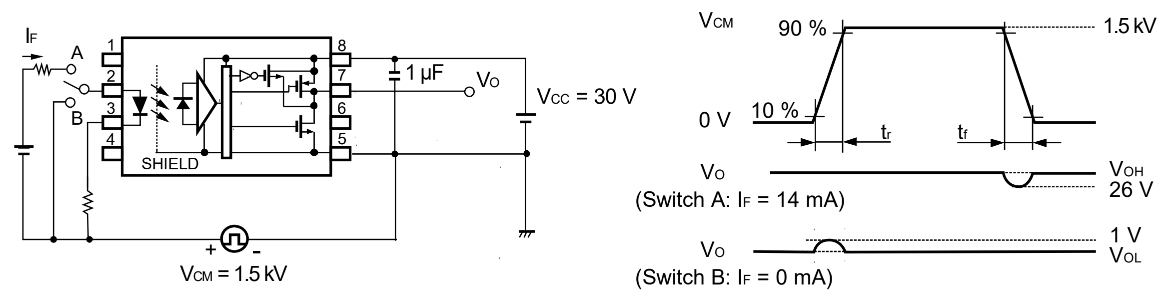
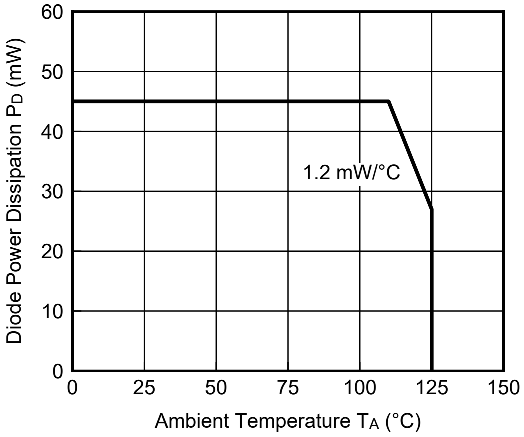


Fig. 10 Test circuit for common mode transient immunity and Wave Forms

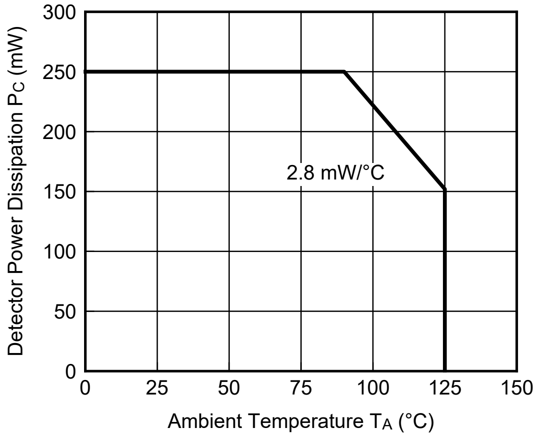


TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

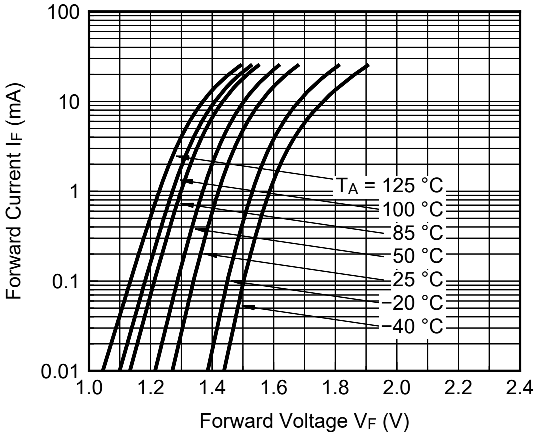
DIODE POWER DISSIPATION vs.
AMBIENT TEMPERATURE



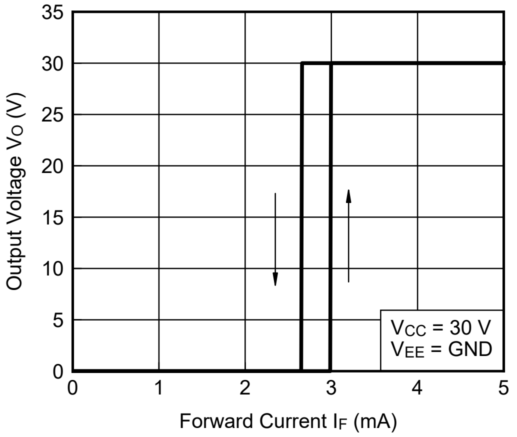
DETECTOR POWER DISSIPATION vs.
AMBIENT TEMPERATURE



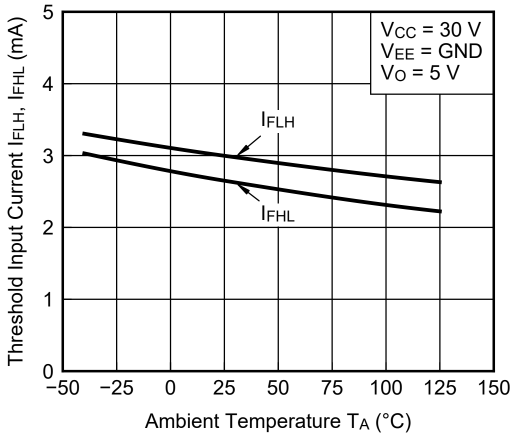
FORWARD CURRENT vs.
FORWARD VOLTAGE



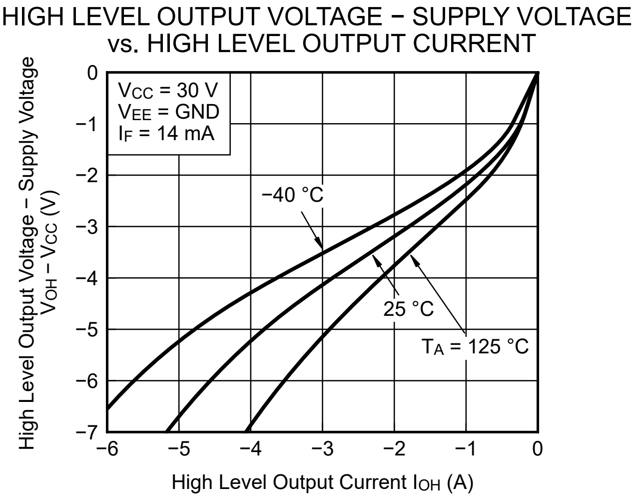
OUTPUT VOLTAGE vs.
FORWARD CURRENT

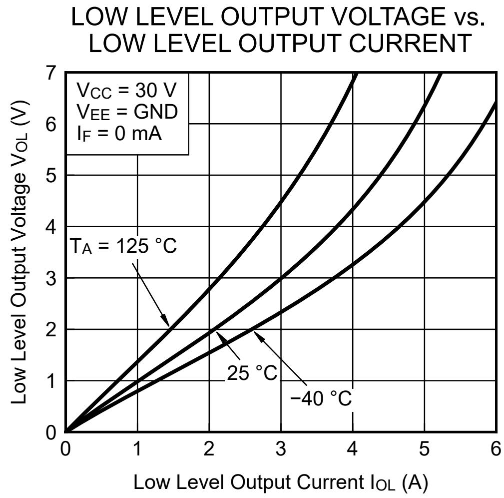


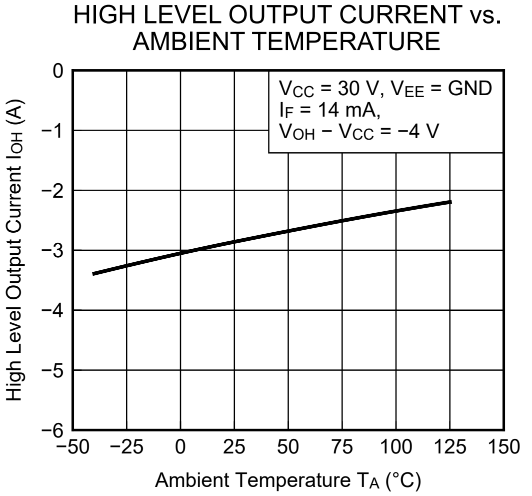
THRESHOLD INPUT CURRENT vs.
AMBIENT TEMPERATURE

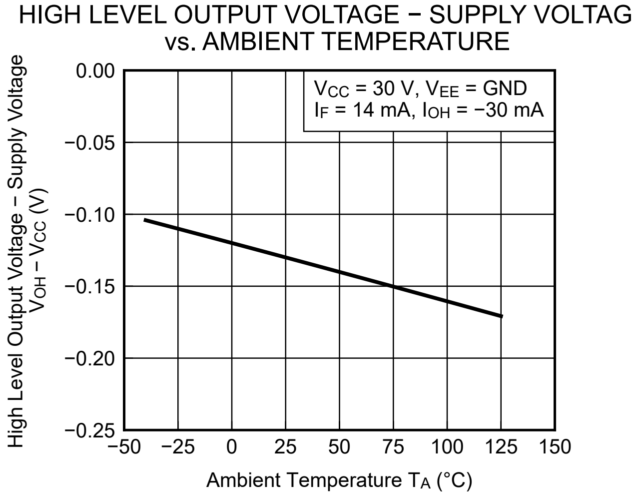


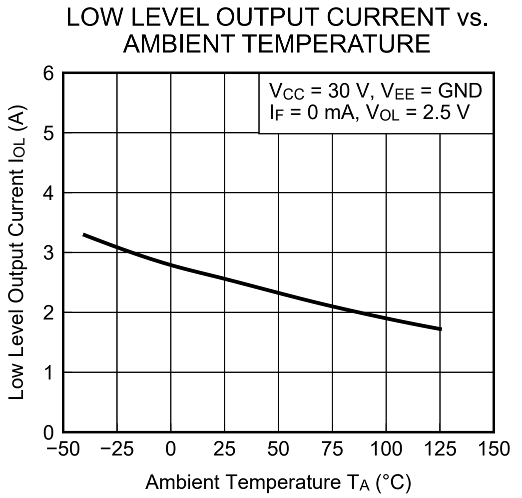
Remark The graphs indicate nominal characteristics.

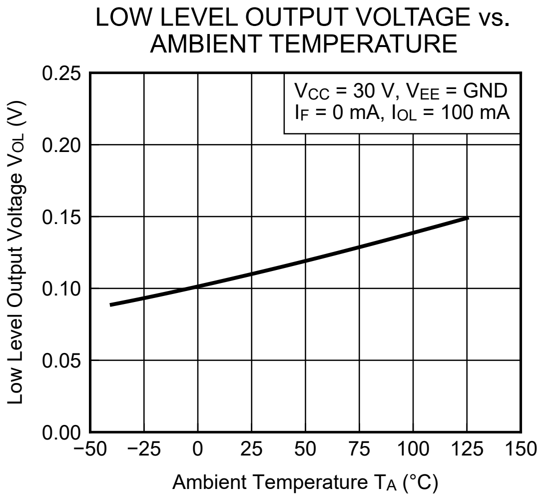








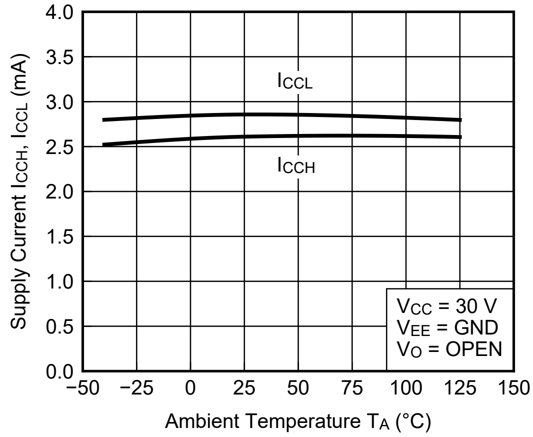




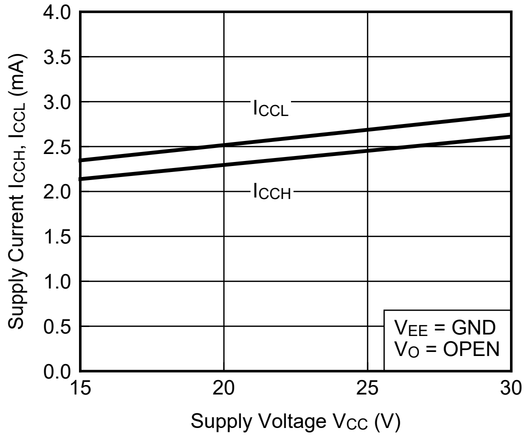
Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

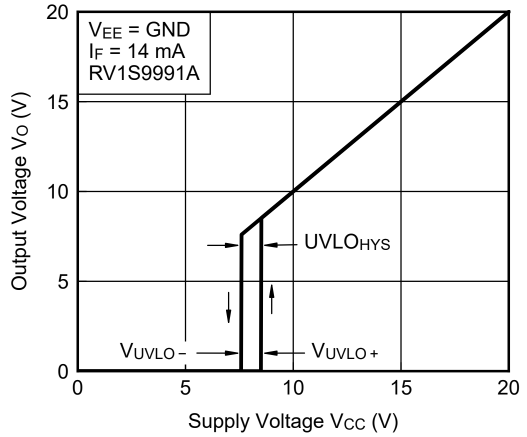
SUPPLY CURRENT vs.
AMBIENT TEMPERATURE



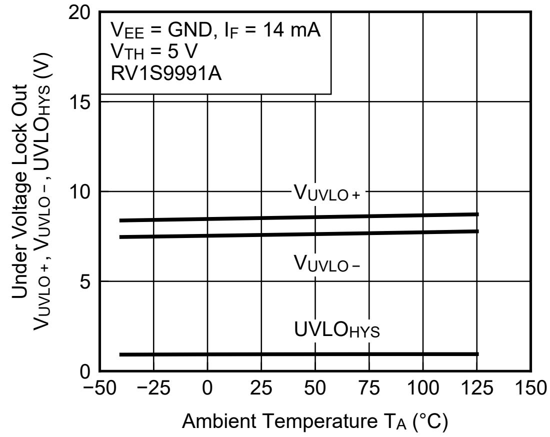
SUPPLY CURRENT vs.
SUPPLY VOLTAGE



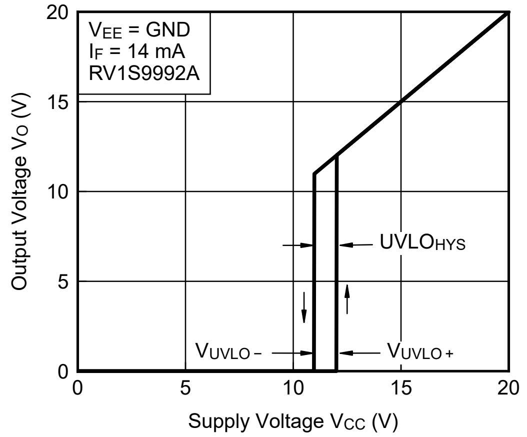
OUTPUT VOLTAGE vs.
SUPPLY VOLTAGE



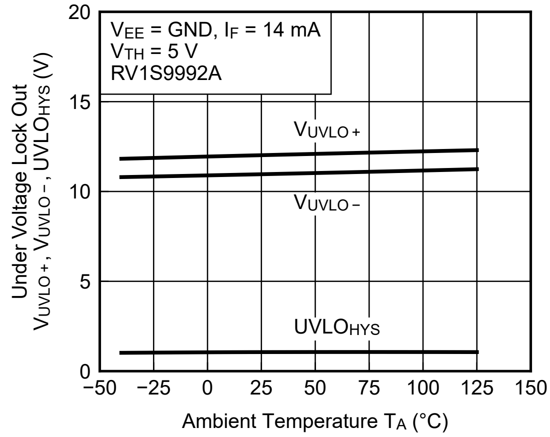
UNDER VOLTAGE LOCK OUT vs.
AMBIENT TEMPERATURE



OUTPUT VOLTAGE vs.
SUPPLY VOLTAGE



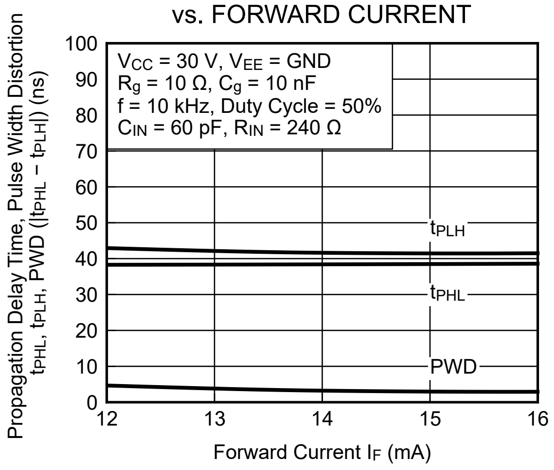
UNDER VOLTAGE LOCK OUT vs.
AMBIENT TEMPERATURE



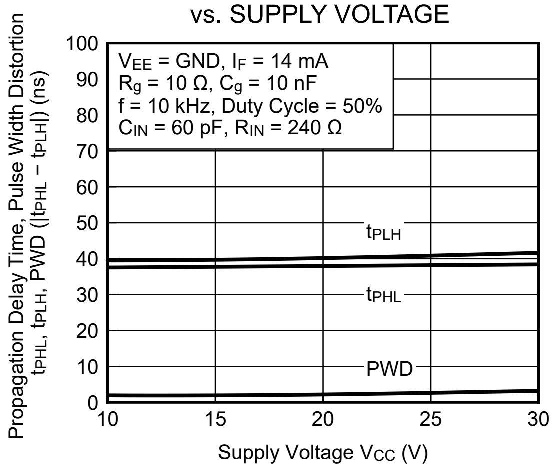
Remark The graphs indicate nominal characteristics.

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise specified)

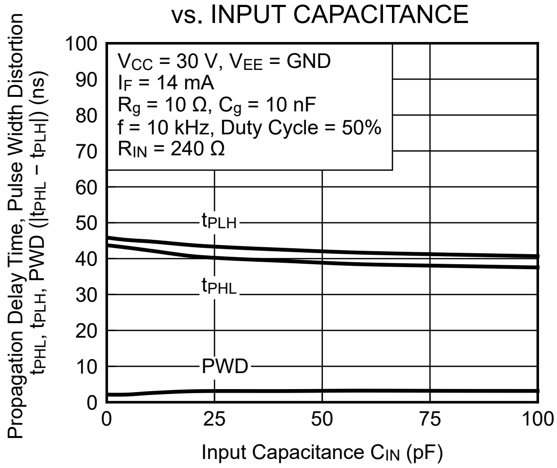
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. FORWARD CURRENT



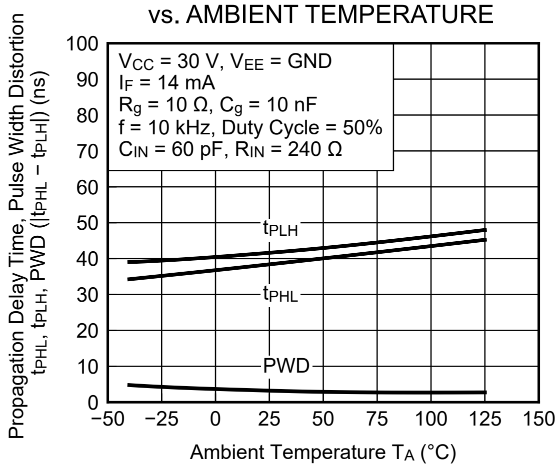
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. SUPPLY VOLTAGE



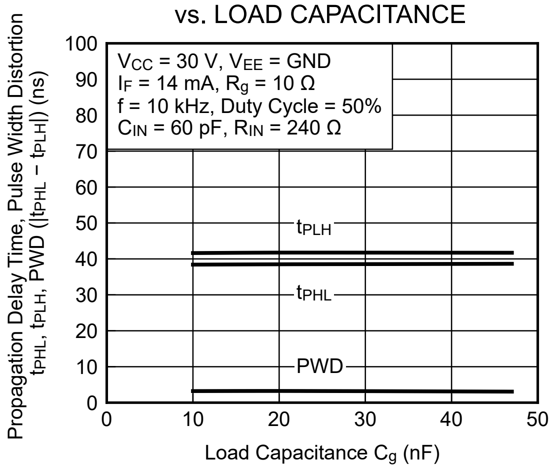
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. INPUT CAPACITANCE



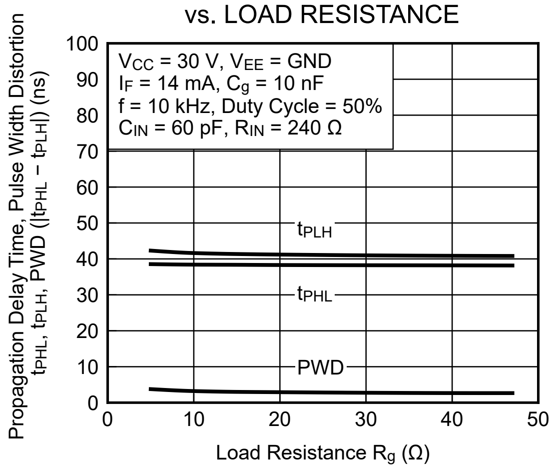
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. AMBIENT TEMPERATURE



PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. LOAD CAPACITANCE



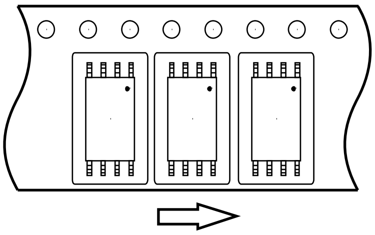
PROPAGATION DELAY TIME, PULSE WIDTH DISTORTION vs. LOAD RESISTANCE



Remark The graphs indicate nominal characteristics.

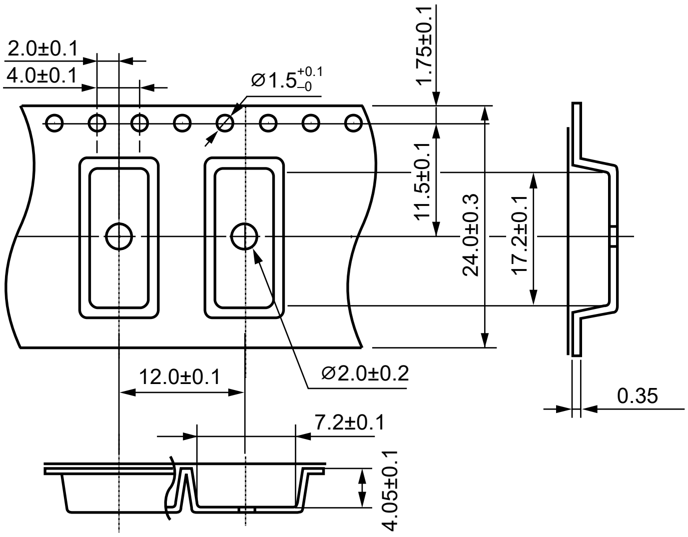
TAPING SPECIFICATIONS (UNIT: mm)

Tape Direction



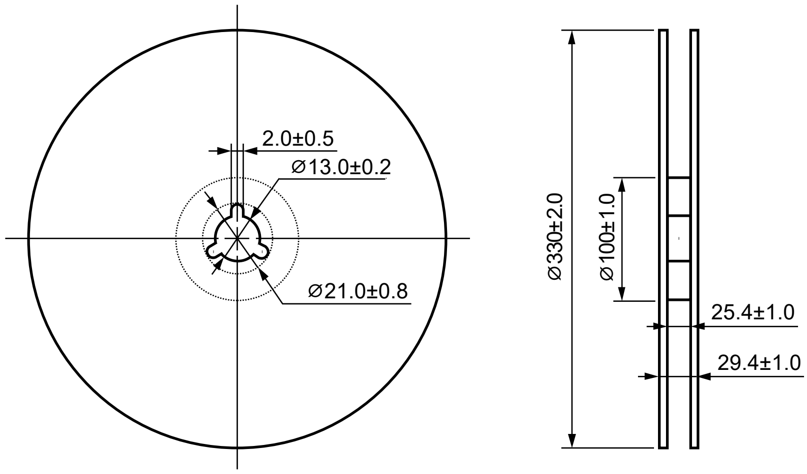
Outline and Dimensions (Tape)

(UNIT: mm)



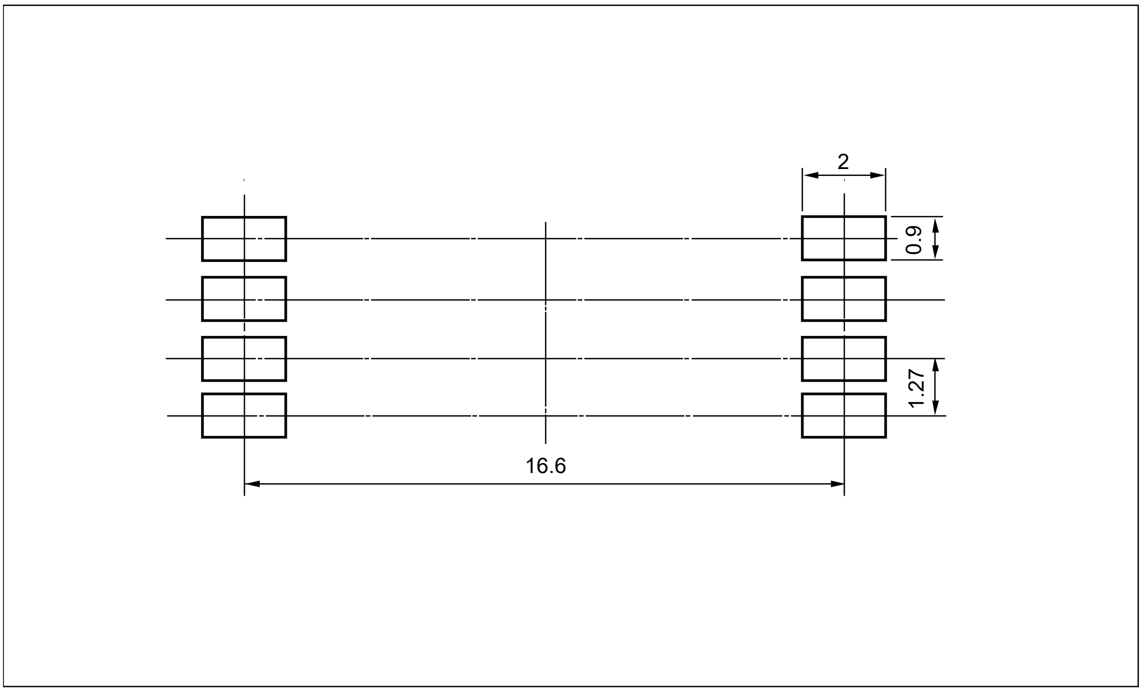
Outline and Dimensions (Reel)

(UNIT: mm)



Packing: 1 000 pcs/reel

RECOMMENDED MOUNT PAD DIMENSIONS (UNIT: mm)

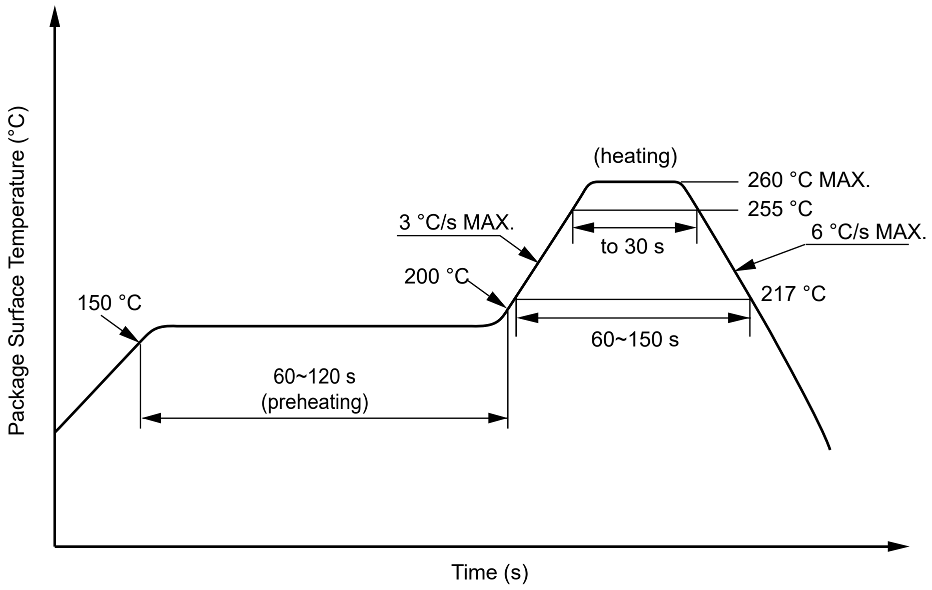


Remark All dimensions in this figure must be evaluated before use.

NOTES ON HANDLING

1. Recommended soldering conditions
   (1) Infrared reflow soldering
   - Peak reflow temperature — 260 °C or below (package surface temperature)
   - Time of peak reflow temperature -5 °C (255 °C) — 30 s or less
   - Time of temperature higher than 217 °C — 60 to 150 seconds
   - Time to preheat temperature from 150 to 200 °C — 60 to 120 seconds
   - Number of reflows — Three
   - Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



JEDEC J-STD-020F compliant soldering conditions

   (2) Wave soldering
   - Temperature — 260 °C or below (molten solder temperature)
   - Time — 10 s or less
   - Preheating conditions — 120 °C or below (package surface temperature)
   - Number of times — One (Allowed to be dipped in solder including plastic mold portion.)
   - Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

   (3) Soldering by Soldering Iron
   - Peak temperature (lead part temperature) — 350 °C or below
   - Time (per one side) — 3 s or less
   - Flux — Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt % is recommended.)
   - Place — 1.5 to 2.0 mm or more away from the root of the lead

   (4) Cautions
   - Flux cleaning — Avoid cleaning with Freon- or halogen-based (chlorinated etc.) solvents.
   - Fixing/Coating — Do not use fixing agents or coatings containing halogen-based substances.

2. Cautions regarding noise
Be aware that when voltage is applied suddenly between the photocoupler's input and output at startup, the output transistor may enter the on state, even if the voltage is within the absolute maximum ratings.

USAGE CAUTIONS

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. Board designing

(1) A 1 µF ceramic capacitor is required between V_{CC} and GND as a bypass capacitor.
Since the circuit operates with high current and high-speed switching, place the photocoupler and the bypass capacitor as close together as possible to reduce parasitic inductance and minimize noise effects.
It is recommended to make the GND pattern as wide as possible and to mount the photocoupler and the bypass capacitor on the same side of the board.

(2) In the board artwork, ensure that the patterns of the IGBT collector/emitter or the MOSFET source/drain do not come close to the input of this product.
Coupling between the above patterns may allow transients from the IGBT/MOSFET side to enter the LED input of this product, which could cause malfunction or performance degradation.
(If it is necessary to route the patterns close to each other, design the input drive circuit so that the LED remains reverse-biased when off, preventing the LED from turning on due to transient coupling.)

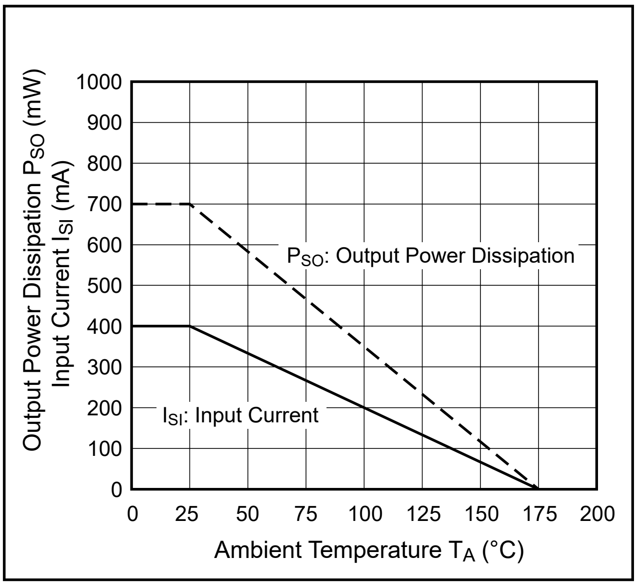
(3) Pin 1, 4 (which is an NC*1 pin) can either be connected directly to the GND pin on the LED side or left open. Also, Pin 6 (which is an NC*1 pin) can either be connected directly to the GND pin on the detector side or left open.
Unconnected pins should not be used as a bypass for signals or for any other similar purpose because this may degrade the internal noise environment of the device.
Note: *1. NC: Non-Connection (No Connection)

3. Make sure the rise/fall time of the forward current is 0.5 µs or less.
4. In order to avoid malfunctions, make sure the rise/fall slope of the supply voltage is 3 V/µs or less.
5. Avoid storage at a high temperature and high humidity.

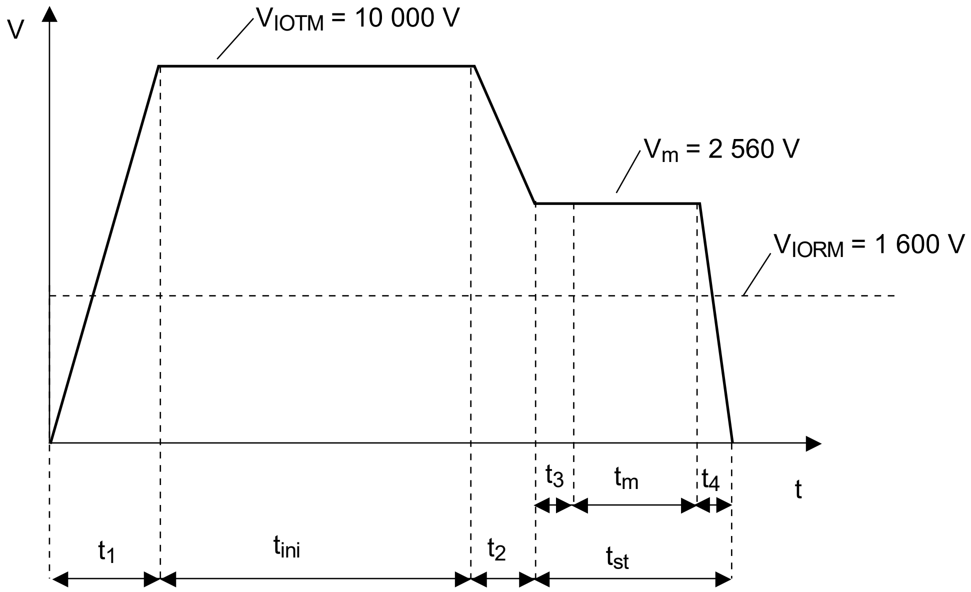
SPECIFICATION OF VDE MARKS LICENSE DOCUMENT

Parameter	Symbol	Rating	Unit
Climatic test class (IEC 60068-1/DIN EN 60068-1)		40/125/21	
Dielectric strength maximum operating isolation voltage Test voltage (partial discharge test, procedure a for type test and random test) $V_m = 1.6 \times V_{IORM.}$, $q_{pd} < 5$ pC	 V_{IORM} V_m	 1 600 2 560	 V_{peak} V_{peak}
Test voltage (partial discharge test, procedure b for all devices) $V_m = 1.875 \times V_{IORM.}$, $q_{pd} < 5$ pC	V_m	3 000	V_{peak}
Highest permissible overvoltage	V_{IOTM}	10 000	V_{peak}
Degree of pollution (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		2	
Comparative tracking index (IEC 60112/DIN EN 60112 (VDE 0303-11))	CTI	175	
Material group (IEC 60664-1/DIN EN 60664-1 (VDE 0110-1))		III a	
Storage temperature range	T_{stg}	−40 to +150	°C
Operating temperature range	T_A	−40 to +125	°C
Isolation resistance, minimum value $V_{I\text{-}O}$ = 500 V dc, T_A = 25 °C $V_{I\text{-}O}$ = 500 V dc, T_A = maximum temperature of rating, at least 100 °C	 $R_{I\text{-}O}$ MIN. $R_{I\text{-}O}$ MIN.	 10^{12} 10^{11}	 Ω Ω
Safety maximum ratings (maximum permissible in case of fault, see thermal derating curve) Maximum ambient temperature Maximum input current Maximum output power dissipation Isolation resistance, minimum value at $V_{I\text{-}O}$ = 500 V dc, $T_A = T_S$	 T_S I_{SI} P_{SO} $R_{I\text{-}O}$ MIN.	 175 400 700 10^9	 °C mA mW Ω

Dependence of maximum safety ratings on ambient temperature

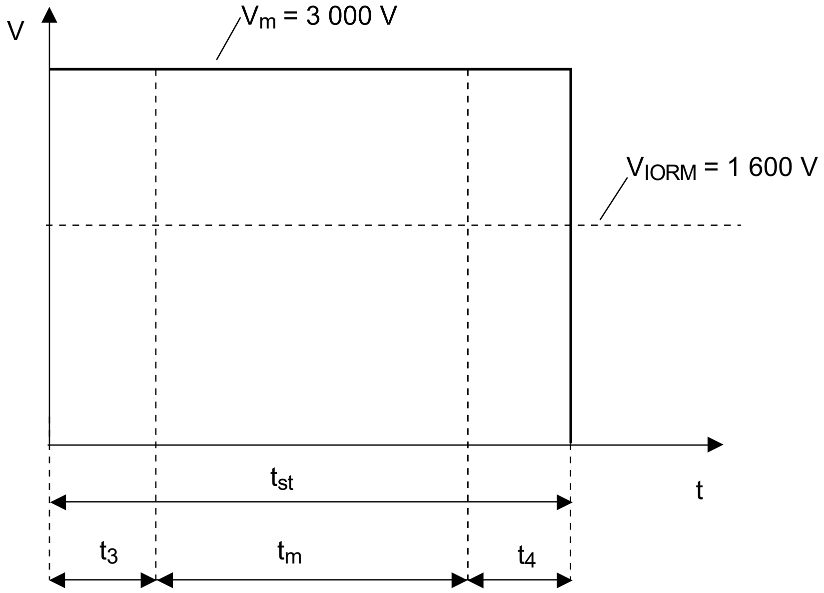


Method a) Destructive Test, Type and Sample Test



t_1, t_2 = 1 to 10 sec
t_3, t_4 = 1 sec
t_m = 10 sec
t_{st} = 12 sec
t_{ini} = 60 sec

Method b) Non-destructive Test, 100% Production Test



t_3, t_4 = 0.1 sec
t_m = 1.0 sec
t_{st} = 1.2 sec

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. ・Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. ・Do not burn, destroy, cut, crush, or chemically dissolve the product. ・Do not lick the product or in any way allow it to enter the mouth.

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit: www.renesas.com/contact/.