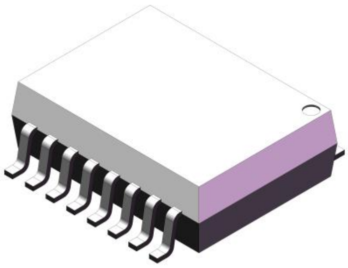
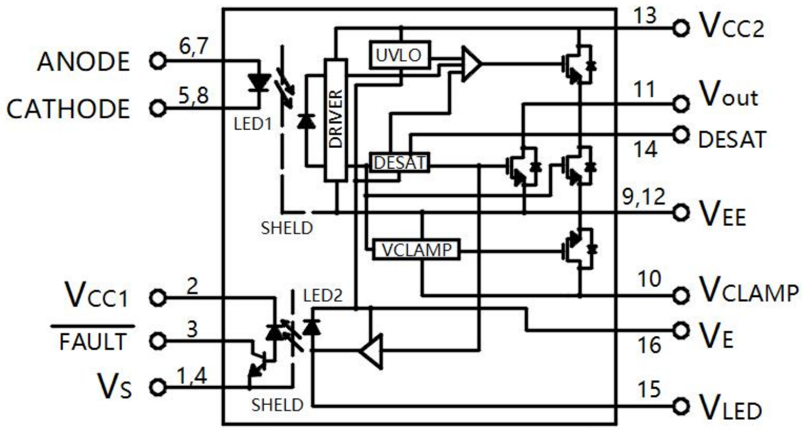
Product packaging logic diagram



WSOP16



Pin Configuration

Features

- 50 kV/μs minimum Common Mode Rejection
- 15V ~ 30V Wide operating VCC Range
- Maximum peak output current 2.5A
- The output stage can drive IGBTs with 150A and 1200V;
- Creepage distance > 7.0mm;
- Operating Temperature: -55℃~110℃
- Environmentally friendly products, compliant with CQC, UL, and VDE requirements

Mechanical Data

- Case: WSOP16
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solder ability-per MIL-STD-202, Method 208

Applications

- industrial automation equipment; Used for inverters, communication servers, improving system stability and energy efficiency;
- Automotive Electronic Systems; Motor drive for electric vehicles, Electronic brake system enhances safety and switch efficiency;
- In the field of new energy generation; the process of energy conversion and transmission in photovoltaic, wind power generation, etc;
- Power transmission system; Support high-voltage direct current transmission and flexible alternating current transmission systems; Ensure the stable operation of transmission lines



Ordering Information

XL	332J	(M)	(G)	-	(U)	(N)	(Y)
①	②	③	④		⑤	⑥	⑦

① Brand(XL)

② Product series(332J)

③ Package type (WSOP16)

④ Halogen option(None :Halogen free)

⑤ Lead frame (None: Copper)

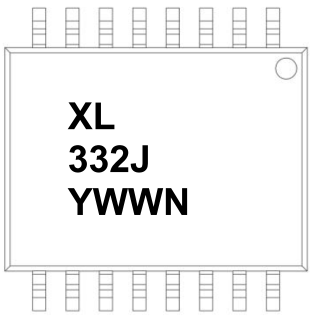
⑥ Customer option 1 (0-9 or A-Z or none)

⑦ Customer option 2 (0-9 or A-Z or none)

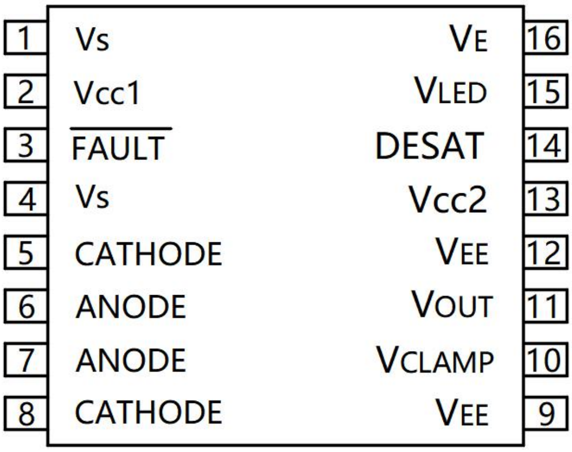
Part Number	Package	Shipping Quantity	Marking Code
XL332JSX	WSOP16	850pcs / Tape & Reel	XL3120X

Marking Information

- " XL" denotes brand.
- " 332J " denotes Product series.
- " Y" denotes Year : A(2024), B(2025), C(2026)
- " WW" denotes Week' s number .
- " N" denotes the day of Week.



pin Function Description



PIN	Symbol	Description
1	VS	Input Ground
2	VCC1	Positive input supply voltage (3.3V to 5.5V)
3	$\overline{\text{FAULT}}$	Fault output. FAULT changes from a high impedance State to a logic low output within 5μs of the voltage on The DESAT pin exceeding an internal reference voltage of 7V. FAULT output is an open collector which allows the FAULT outputs from all AT332J in a circuit to be connected together in a"wired OR"forming a single fault bus for inter facing directly to the micro-controller.
4	VS	Input Ground
5	CATHODE	Cathode
6	ANODE	Anode
7	ANODE	Anode
8	CATHODE	Cathode
9	VEE	Output supply voltage.
10	VCLAMP	Miller clamp
11	VOUT	Gate drive voltage output
12	VEE	Output supply voltage.
13	VCC2	Positive output supply voltage
14	DESAT	Desaturation voltage input. When the voltage on DESAT exceeds an internal reference voltage of 6.5V while the IGBT is on, FAULT output is changed from a high impedance state to a logic low state within 5μs.
15	VLED	LED anode. This pin must be left unconnected for guaranteed data sheet performance. (For optical coupling testing only)
16	VE	Common (IGBT emitter) output supply voltage.

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Min.	Max.	Unit
Input	Average Input Current	IF(AVG)	25	-	mA
	Peak Transient Input Current	IF(TRAN)	1.0	-	A
	Reverse Input Voltage	VR	5	-	V
	Positive Input Supply Voltage	VCC1	-0.5	7.0	V
	Input IC Power Dissipation	PI	150	-	mW
Output	"High" Peak Output Current	OH(PEAK)	-	2.5	A
	"Low" Peak Output Current	IOL(PEAK)	-	2.5	A
	FAULT Output Current	IFAULT	-	8.0	mA
	FAULT Pin Voltage	VFAULT	-0.5	VCC1	V
	Total Output Supply Voltage	(VCC2 - VEE)	-0.5	35	V
	Negative Output Supply Voltage	(VE - VEE)	-0.5	15	V
	Positive Output Supply Voltage	(VCC2 - VE)	-0.5	30	V
	Gate Drive Output Voltage	VO(PEAK)	-0.5	VCC2	V
	Peak Clamping Sinking Current	IClamp	-	1.7	A
	Miller Clamping Pin Voltage	VClamp	-0.5	VCC2	V
	DESAT Voltage	VDESAT	VE	VE + 10	V
	Output IC Power Dissipation	PO	0	600	mW

Thermal Characteristics

Parameter	Symbol	Value	Unit
Isolation Voltage *1	VISO	5000	Vrms
Operating Temperature	TOPR	-55 ~ +100	℃
Storage Temperature Range	TSTG	-55 ~ +125	℃
Soldering Temperature *2	TSOL	260	℃

Notes:
1. 40 to 60% RH, AC for 1 minute
2. For 10 seconds

Electrical Characteristics (@ TA = 25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
FAULT Logic Low Output Voltage	VFAULTL	IFAULT = 1.1mA, VCC1 = 5.5V	-	0.07	0.4	V
		IFAULT = 1.1mA, VCC1 = 3.3V	-	0.07	0.4	V
FAULT Logic High Output Current	IFAULTH	VFAULT = 5.5V, VCC1 = 5.5V	-	0.05	0.5	μA
		VFAULT= 3.3 V, VCC1 = 3.3V	-	0.01	0.3	μA
High Level Output Current	IOH	VO = VCC2 – 4	-0.5	-1.5	-	A
		VO = VCC2 –15	-2.0	-	-	A
Low Level Output Current	IOL	VO = VEE + 2.5	0.5	1.5	-	A
		VO = VEE + 15	2.0	-	-	A
Low Level Output Current During Fault Condition	IOLF	VOUT - VEE = 14V	90	140	230	mA
High Level Output Voltage	VOH	O = -650μA	VCC-2.9	VCC-0.1	-	V
Low Level Output Voltage	VOL	IO = 100mA	-	0.08	0.5	V
Clamp Pin Threshold Voltage	Vt Clamp	-	-	-	2.5	V
Clamp Low Level Sinking Current	ICL	VO = VEE + 2.5	0.5	1.5	-	A
High Level Supply Current	ICC2H	IO = 0mA	-	2.4	4.5	mA
Low Level Supply Current	ICC2L	IO = 0mA	-	2.4	4.5	mA
Blanking Capacitor Charging Current	CHG	VDESAT = 2V	-0.13	-0.23	-0.33	mA
Blanking Capacitor Discharge Current	IDSCHG	VDESAT = 7.0V	10	30	-	mA
DESAT Threshold	VDESAT	VCC2 -VE >VUVLO	6	6.6	7.5	V
UVLO Threshold	VUVLO+	IF = 10mA, VO > 5 V	10.5	11.6	12.5	V
	VUVLO-	IF = 10mA, VO < 5 V	9.2	10.5	11.1	V
UVLO Hysteresis	(VUVLO+ VUVLO-)	-	-	1.2	-	V
Threshold Input Current Low to High	IFLH	IO = 0mA, VO > 5 V	-	2.6	5.0	mA
Threshold Input Voltage High to Low	VFHL	IO = 0mA, VO < 5 V	0.8	-	-	V
Input Forward Voltage	VF	IF = 10mA	1.2	1.4	1.95	V
Temperature Coefficient of Input Forward Voltage	ΔVF/ΔTA	-	-	-1.3	-	mV/°C
Input Reverse Breakdown Voltage	BVR	IR = 10uA	5	-	-	V
Input Capacitance	CIN	f = 1MHz, VF = 0V	-	70	-	pF

Switching Characteristics (@ T_A = -40°C～85°C, V_{CC}= 5V, I_F= 7.5mA, unless otherwise specified)

Unless otherwise noted, all typical values at TA = 25°C, VCC2 = 30 V, VEE = Ground; All Minimum/Maximum specifications are at Recommended Operating Conditions.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Propagation Delay Time to High Output Level	tPLH	Rg = 10 Ω, Cg = 10nF, f = 10 kHz, Duty Cycle = 50%, IF = 10mA, VCC2 = 30 V	50	180	250	ns
Propagation Delay Time to Low Output Level	tPHL		50	180	250	ns
Pulse Width Distortion	PWD		-80	30	80	ns
Propagation Delay Difference Between Any Two Parts or Channels	PDD		-100	-	100	ns
Rise Time	Tr		-	50	-	ns
Fall Time	Tf		-	50	-	ns
DESAT Sense to 90% VO Delay	tDESAT (90%)	CDESAT = 100pF, Rg = 10 Ω, Cg = 10nF, VCC2 = 30 V	-	0.25	0.5	μs
DESAT Sense to 10% VO Delay	tDESAT (10%)		-	2	3	μs
DESAT Sense to Low Level FAULT Signal Delay	tDESAT (FAULT)	CDESAT = 100pF, RF = 2.1kΩ, CF = Open, Rg = 10 Ω, Cg = 10nF, VCC2 = 30 V	-	0.25	0.5	μs
DESAT Sense to DESAT Low Propagation Delay	tDESAT (LOW)		-	0.25	-	μs
DESAT Input Mute	tRESET (MUTE)	-	5	15	-	μs
RESET to High Level FAULT Signal Delay	tRESET (FAULT)	CDESAT = 100pF, RF = 2.1kΩ, Rg =10 Ω, Cg = 10nF, VCC1 = 5.5V, VCC2 = 30 V	-	1	2.0	μs

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

Fig.1 Vout propagation delay wave forms

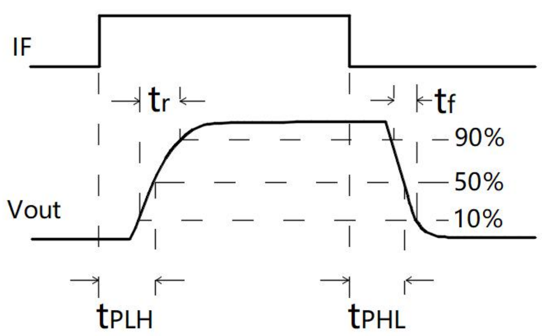


Fig.2 Output High Current vs Ambient Temperature

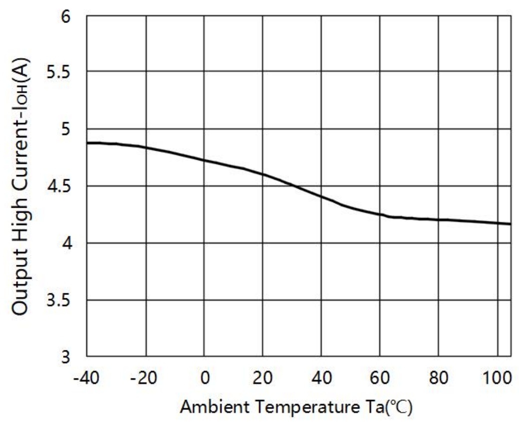


Fig.3 Output Low Current vs Ambient Temperature

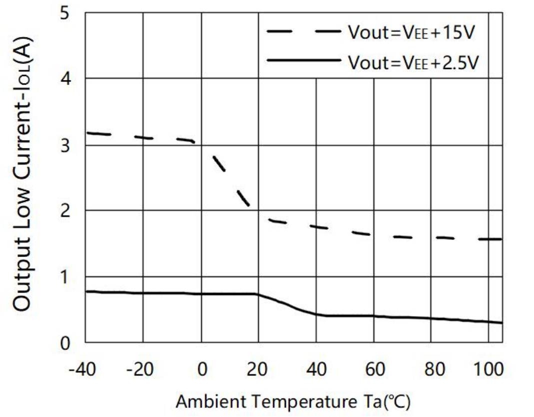


Fig.4 High Output Voltage Drop vs Ambient Temperature

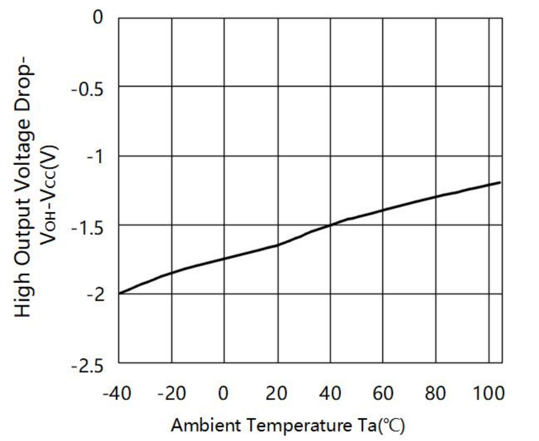


Fig.5 Output Low Voltage vs Ambient Temperature

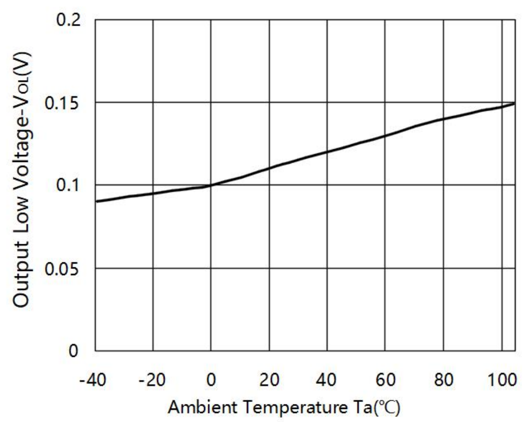
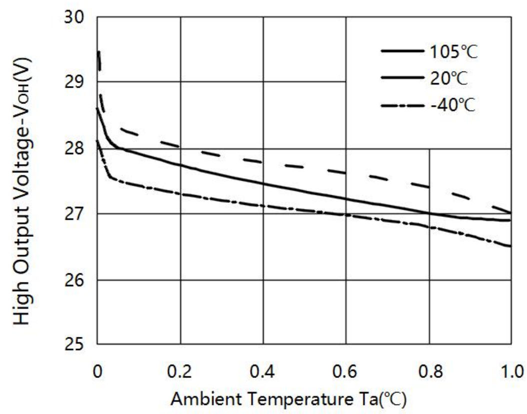


Fig.6 High Output Voltage vs Output High Current



Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

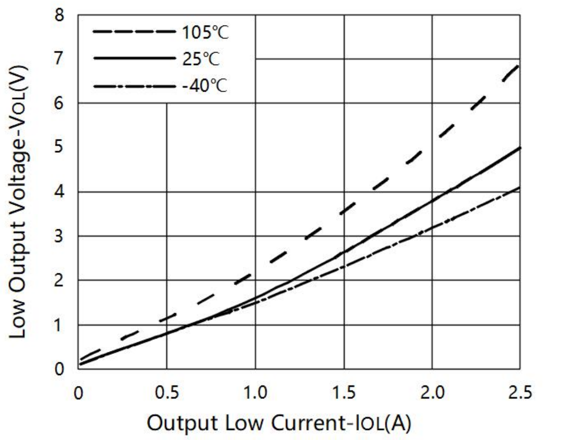


Fig.7 Low Output Voltage vs Output Low Current

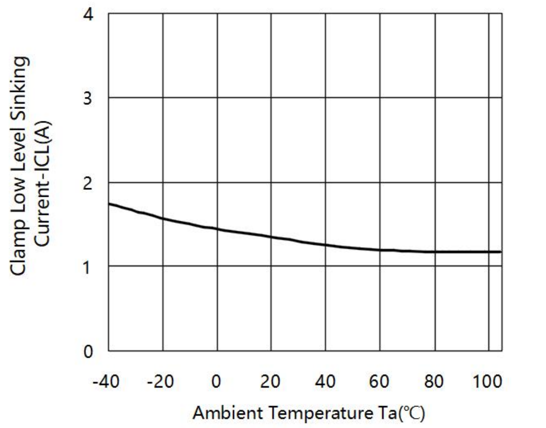


Fig.8 Clamp Low Level Sinking Current vs Ambient Temperture

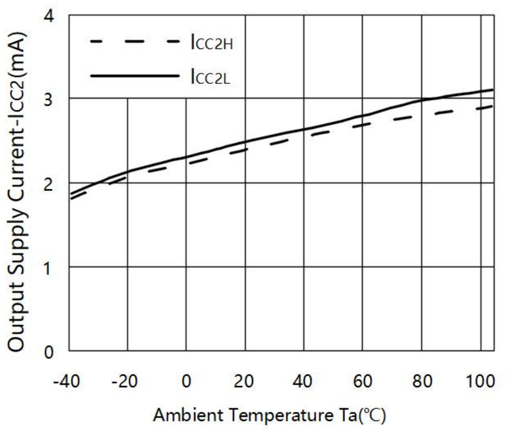


Fig.9 Output Supply Current vs Ambient Temperature

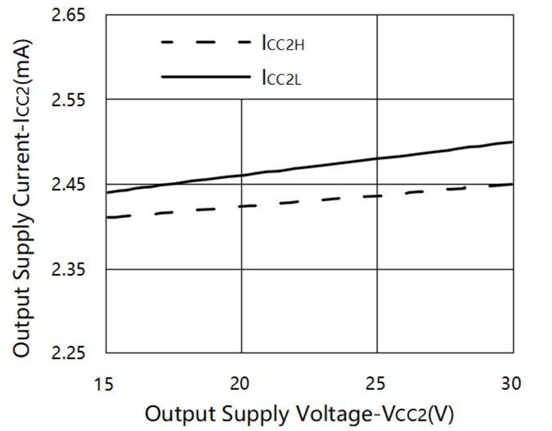


Fig.10 Output Supply Current vs Output Supply Voltage

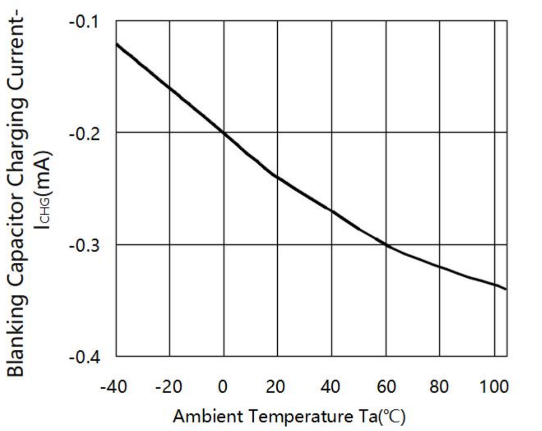


Fig.11 Blanking Capacitor Charging Current vs. Ambient Temperature

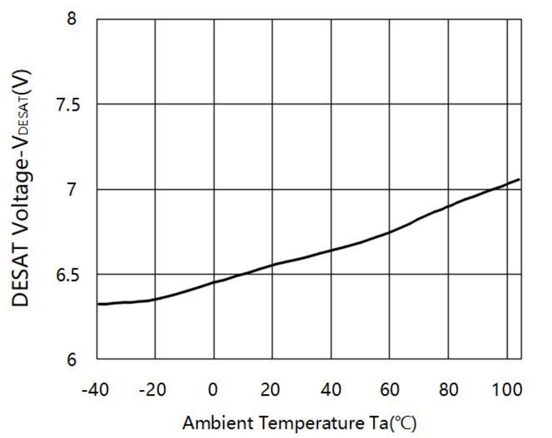


Fig.12 DESAT threshold vs. Ambient Temperature

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

Fig.13 Propagation Delay vs Ambient Temperature

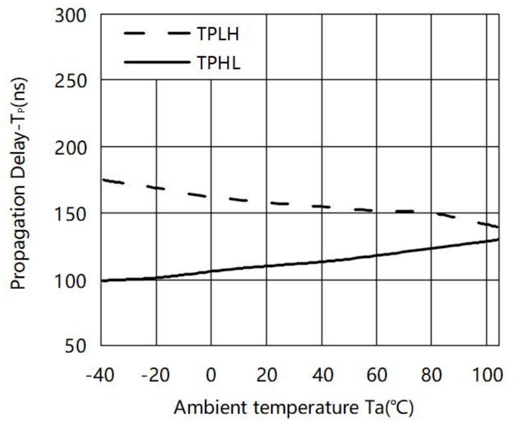


Fig.14 Propagation Delay vs. Supply Voltage

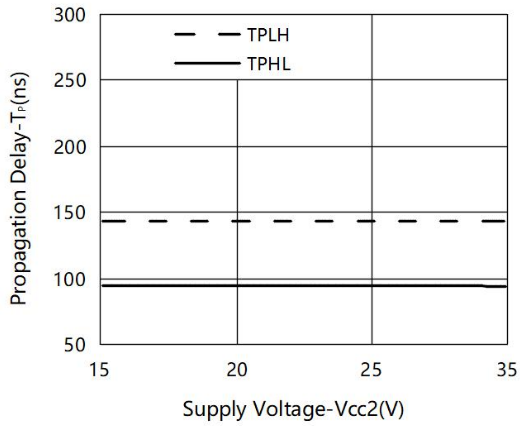


Fig.15 Propagation Delay vs Load Resistance

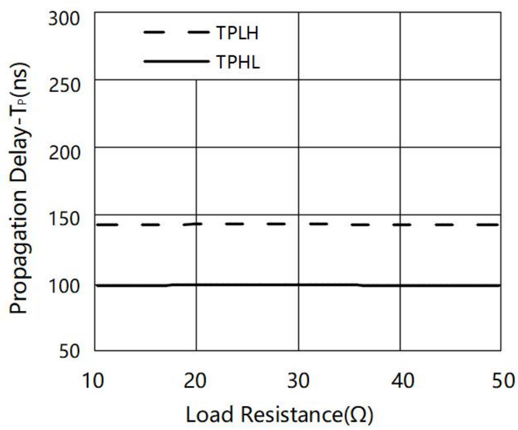


Fig.16 Propagation Delay vs Load Capacitance

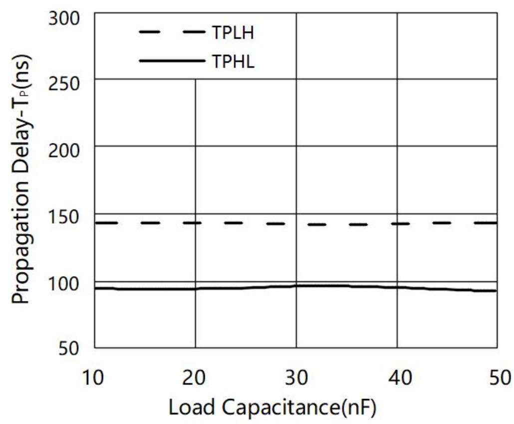


Fig.17 DESAT Sense to 90% Vo Delay vs. Ambient Temperature

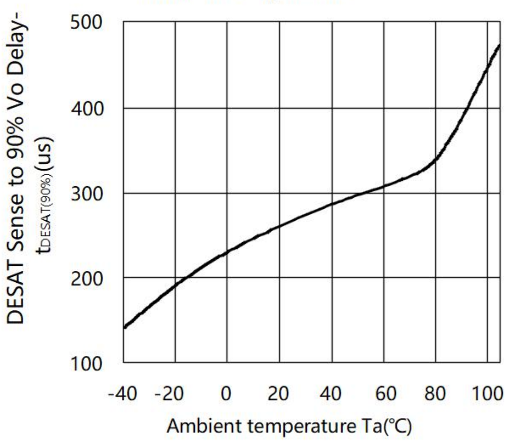
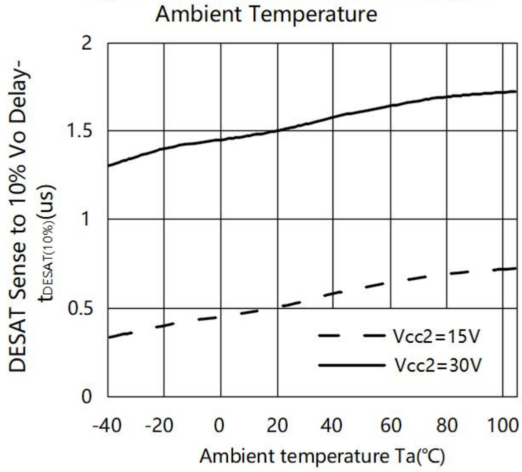
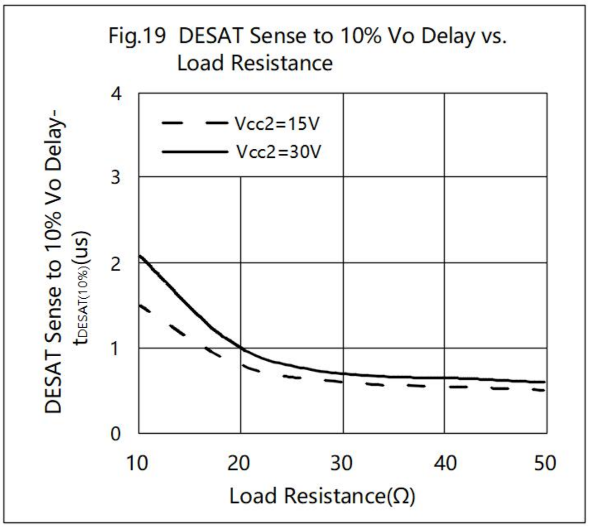
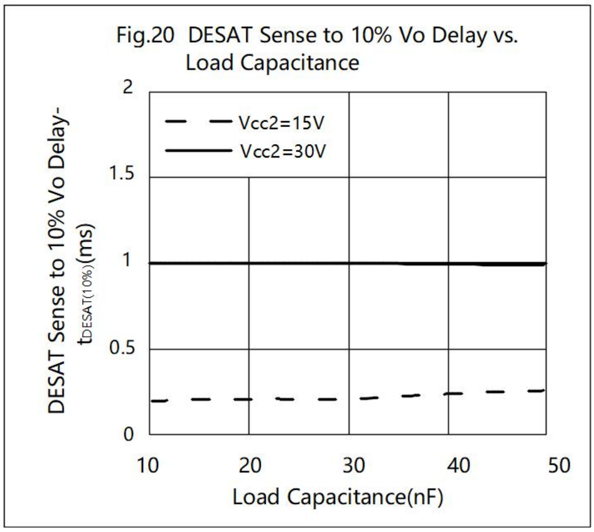


Fig.18 DESAT Sense to 10% Vo Delay vs. Ambient Temperature



Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)





Test Circuits Diagrams

Fig21. IOH Pulsed Test Circuit

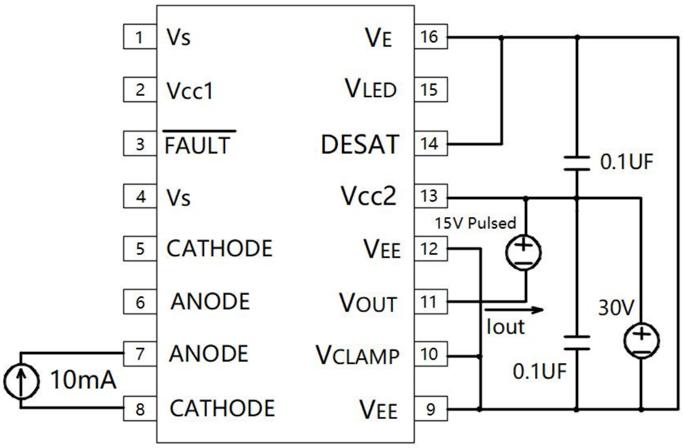


Fig22. IOL Pulsed Test Circuit

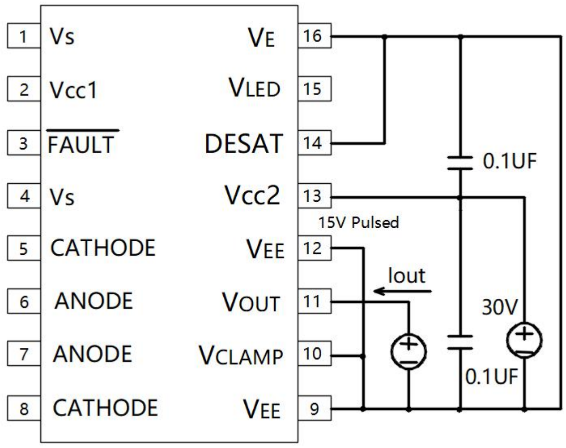


Fig23. VOH Pulsed Test Circuit

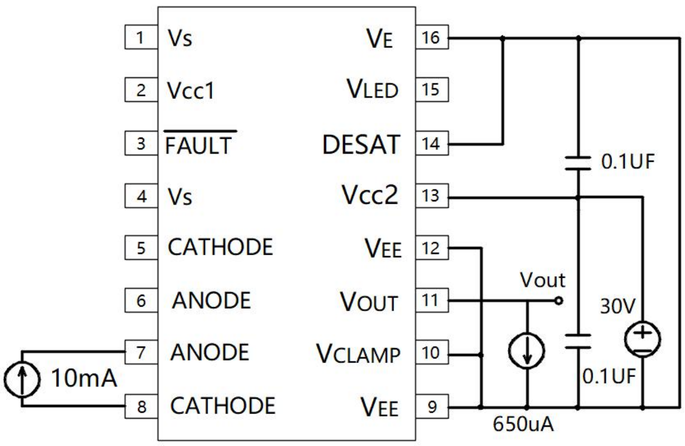


Fig24. VOL Pulsed Test Circuit

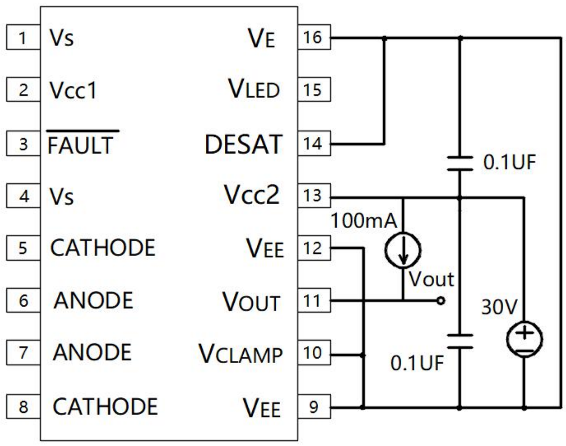


Fig25. ICC2H Test Circuit

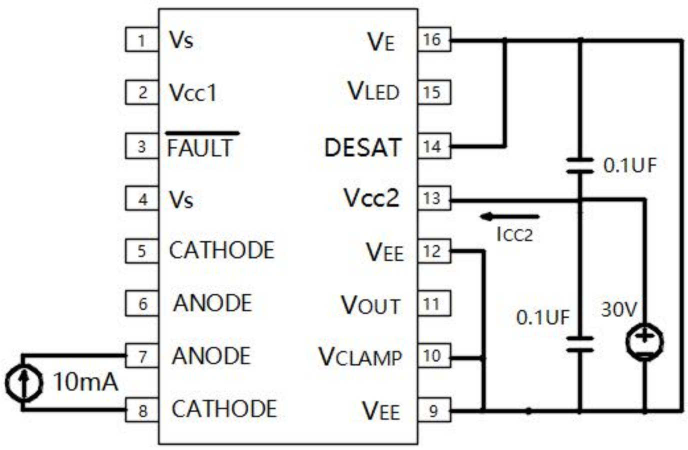


Fig26. ICC2L Test Circuit

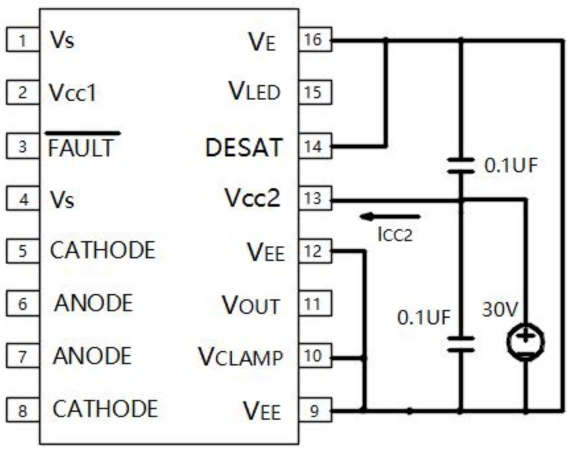


Fig27. ICC2H Pulsed Test Circuit

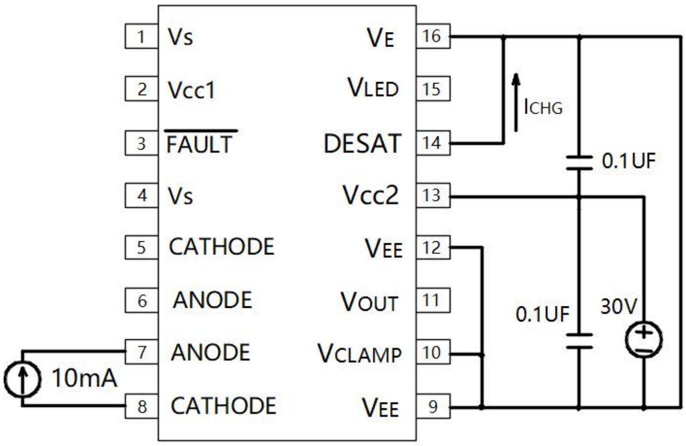


Fig28. IDSCHG Test Circuit

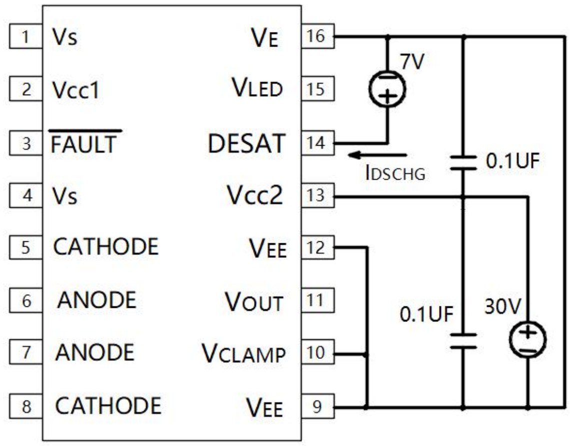


Fig29. TPLH,TPHL,Tr,Tf, Test Circuit

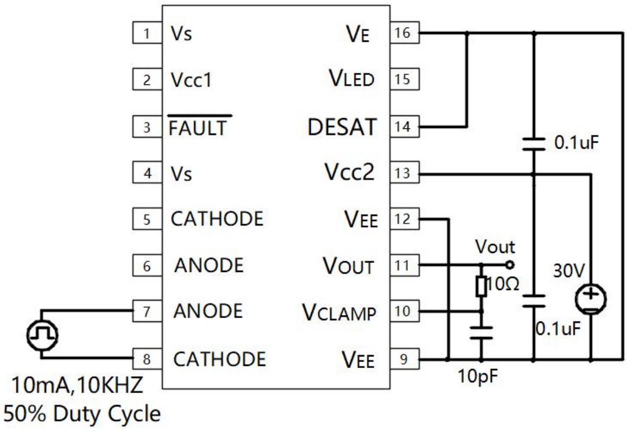


Fig30. TDESAT Fault Test Circuit

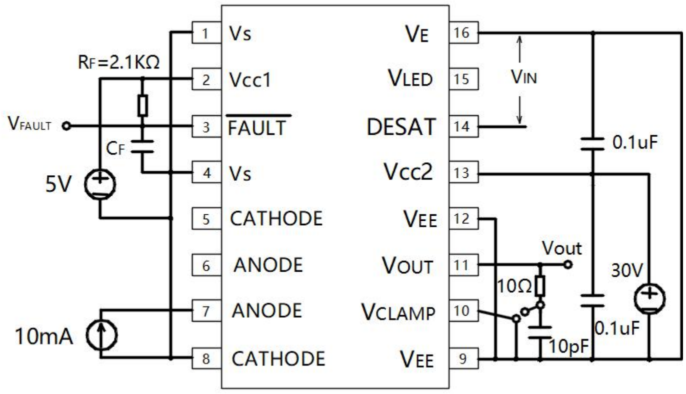


Fig31. CMR Test Circuit LED2 off

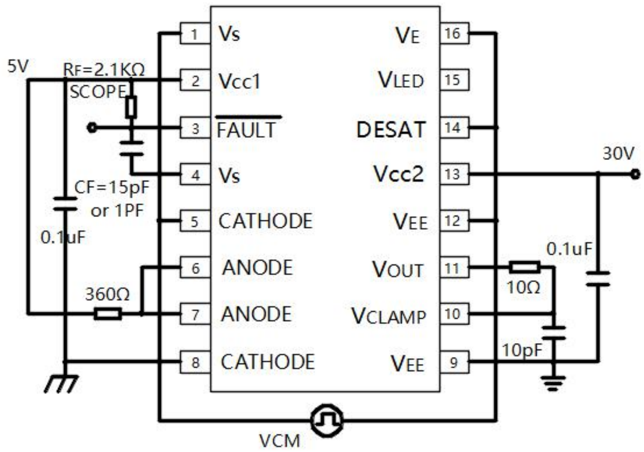


Fig32. CMR Test Circuit LED2 on

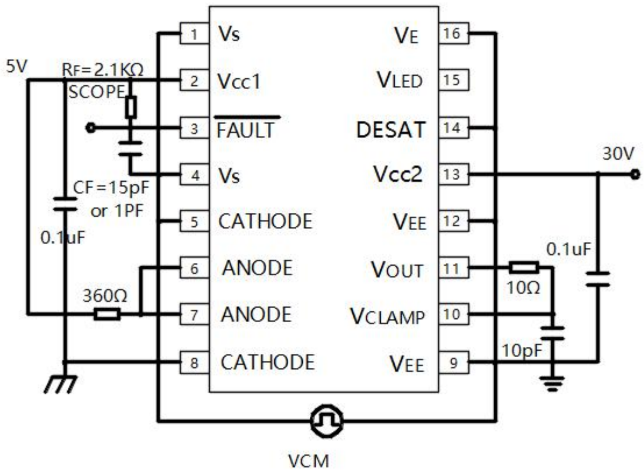


Fig33. CMR Test Circuit LED1 on

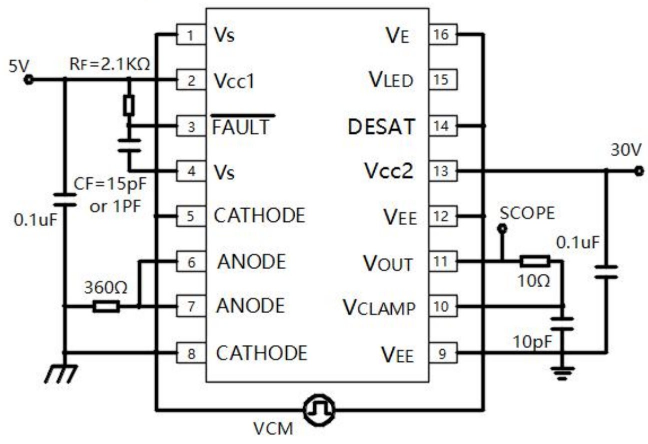
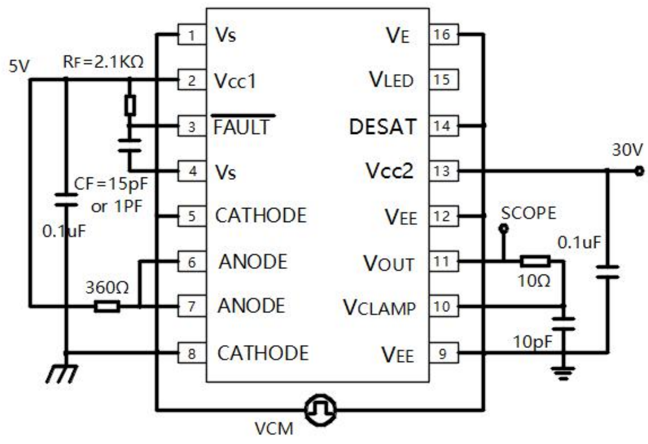


Fig34. CMR Test Circuit LED1 off



Application Information

1、Product Overview Description

The AT332J are highly integrated power control devices that incorporates all the necessary components for a complete, isolated IGBT / MOSFET gate drive circuit with fault protection and feedback into one SOP16 package. Active Miller clamp function eliminates the need of negative gate drive in most application application and allows the use of simple bootstrap supply for high side driver. An optically isolated power output stage drives IGBTs with power ratings of up to 150A and 1200V. A high speed internal optical link minimizes the propagation delays between he micro controller and the IGBT while allowing the two systems to operate at very large common mode voltage differences that are common in industrial motor drives and other power switching applications. An output IC provides local protection for the IGBT to prevent damage during over current, and a second opticalink provides a fully isolated fault status feedback signal for the micro controller. A built in "watchdog" circuit, UVLO monitors the power stage supply voltage to prevent IGBT caused by insufficient gate drive voltages. This integrated IGBT gate driver is designed to increase the performance and reliabi ity of a motor drive without the cost, size, and complexity of a discrete design.

Two light emitting diodes and two integrated circuits housed in the same SOP16 package provide the input control circuitry, the output power stage, and two optical channels. The output Detector IC is designed manufactured on a high voltage BiCMOS/Power DMOS process. The forward optical signal path, as indicated by LED1, transmits the gate control signal. The return optical signal path, as indicated by LED2, transmits the fault status feedback signal.

Under normal operation, the LED1 directly controls the IGBT gate through the isolated output Detector IC, and LED2 remains off. When an IGBT fault is detected, the output detector IC immediately begins a "soft" shutdown sequence, reducing the IGBT current to zero in a controlled manner to avoid potential IGBT damage from inductive over voltages. Simultaneously, this fault status is transmitted back to the input via LED2, where the fault latch disables the gate control input and the active low fault output alerts the microcontroller.

During power-up, the Under Voltage Lockout (UVLO) feature prevents the application of insufficient gate voltage to the IGBT, by forcing the AT332J' s output low. Once the output is in the high state, the DESAT (VCE) detection feature of the AT332J provides IGBT protection. Thus, UVLO and DESAT work in conjunction to provide constant IGBT protection.

2、Recommended Application Circuit

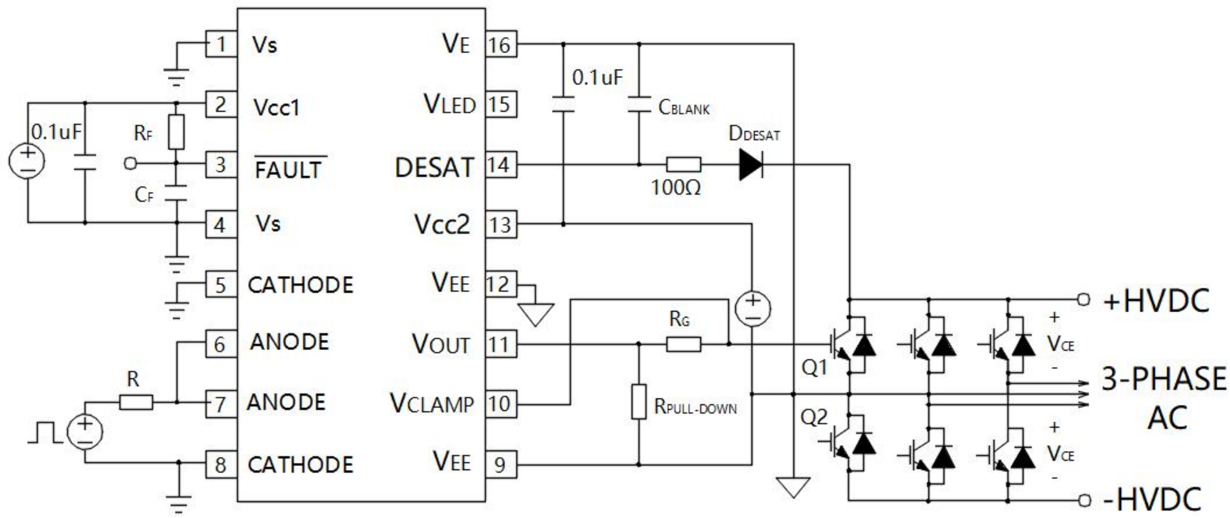
The AT332J has an LED input gate control, and an open collector fault output suitable for wired ‘OR’ applications. The recommended application circuit shown in Fig 35 illustrates a typical gate drive implementation using the AT332J. The following describes about driving IGBT. However, it is also applicable to MOSFET. Depending upon the MOSFET or IGBT gate threshold requirements, designers may want to adjust the VCC supply voltage (Recommended VCC = 17.5V for IGBT and 12.5V for MOSFET).

The two supp y bypass capacitors (0.1μF) provide the arge transient currents necessary during a switching transition. Because of the transient nature of the charging currents, a low current (5mA) power supply suffices. The desaturation diode DDESAT 600V/1200V fast recovery type, trr below 75ns (e.g. ERA34-10) and capacitor CBLANK are necessary external components for the fault detection circuitry. The gate resistor RG serves to limit gate charge current and cont ro s the IGBT collector voltage rise and fall times. The open collector fault output has a passive pul -up resistor RF (2.1kΩ)

and a 1000pF filtering capacitor, CF. A 47kΩ pull down resistor RPULL-DOWN on VOUT provides a predictable high level output voltage (VOH). In this application, the IGBT gate driver will shutdown when a fault is detected and fault reset by next cycle of IGBT turn on.

Fig35. Recommended application circuit (Single Supply)

with desaturation detection and active Miller Clamp



Description of Operation

1、Normal Operation

During normal operation, VOUT of the AT332J is controlled by input LED current IF (pins 5, 6, 7 and 8), with the IGBT collector-to-emitter voltage being monitored through DESAT. The FAULT output is high. See Fig 36.

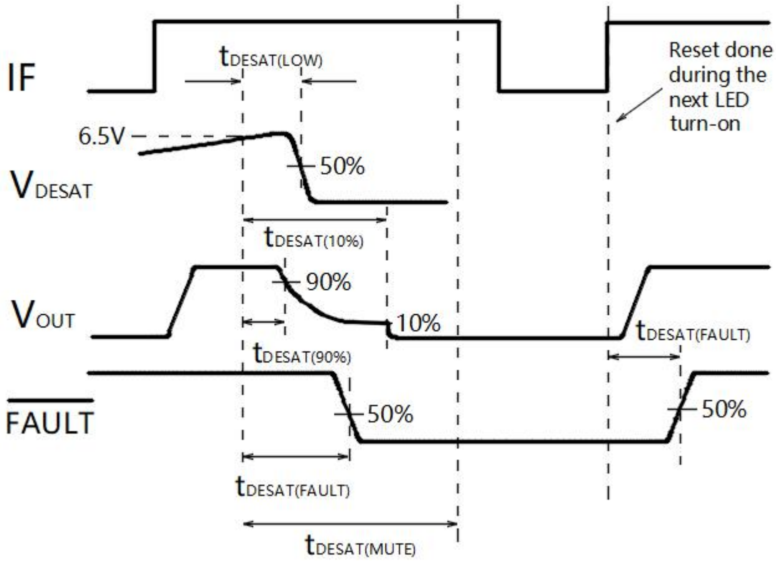
2、Fault Condition

The DESAT pin monitors the IGBT Vce voltage. When the voltage on the DESAT pin exceeds 6.5V while the IGBT is on, VOUT is slowly brought low in order to "softly" turn-off the IGBT and prevent large di/dt induced voltages. Also activated is an internal feedback channel which brings the FAULT output low for the purpose of notifying the micro- controller of the fault condition.

3、Fault Reset

Once fault is detected, the output will be muted for 5μs (minimum). All input LED signals will be ignored during the mute period to allow the driver to completely soft shut-down the IGBT. The fault mechanism can be reset by the next LED turn-on after the 5us (minimum) mute time. See Fig 36.

Fig 36. Fault Timing diagram



4、Output Control

The outputs (VOUT and FAULT) of the AT332J are controlled by the combination of IF, UVLO and a detected IGBT Desat condition. Once UVLO is not active (VCC2 - VE > VUVLO), VOUT is allowed to go high, and the DESAT (Pin14) detection feature of the AT332J will be the primary source of IGBT protection. Once VCC2 is increased from 0V to above VUVLO+, DESAT will remain functional until

VCC2 is decreased below VUVLO- . Thus, the DESAT detection and UVLO features of the AT332J work in conjunction to ensure constant IGBT protection.

IF	UVLO(VCC2-VE)	DESAT Function	FAULT Output	VOUT
ON	Active	Not Active	High	Low
ON	Not Active	Active (with DESAT fault)	Low (FAULT)	Low
ON	Not Active	Active (no DESAT fault)	High (or no fault)	High
OFF	Active	Not Active	High	Low
OFF	Not Active	Not Active	High	Low

5、Desaturation Detection and High Current Protection

The AT332J satisfies these criteria by combining a high speed, high output current driver, high voltage optical isolation between the input and output, local IGBT desaturation detection and shutdown, and an optically isolated fault status feedback signal into a single 16-pin surface mount package.

The fault detection method, which is adopted in the AT332J, is to monitor the saturation (collector) voltage of the IGBT and to trigger a local fault shutdown sequence if the collector voltage exceeds a predetermined threshold. A small gate discharge device s owly reduces the high short circuit IGBT current to prevent damaging voltage spikes. Before the dissipated energy can reach destructive levels, the IGBT is shut off. During the off state of the IGBT, the fault detect circuitry is simply disabled to prevent false ‘fault’ signals.

The alternative protection scheme of measuring IGBT current to prevent desaturation is effective if the short circuit capability of the power device is known, but this method will fail if the gate drive voltage decreases enough to only partially turn on the IGBT. By directly measuring the collector voltage, the AT332J limits the power dissipation in the IGBT even with insufficient gate drive voltage. Another more subtle advantage of the desaturation detection method is that power dissipation in the IGBT is monitored, while the current sense method relies on a preset current threshold to predict the safe limit of operation. Therefore, an overly conservative over current threshold is not needed to protect the IGBT.

6、Slow IGBT Gate Discharge during Fault Condition

When a desaturation fault is detected, a weak pull-down device in the AT332J output drive stage will turn on to ‘softly’ turn off the IGBT. This device slowly discharges the IGBT gate to prevent fast changes in drain current that could cause damaging voltage spikes due to lead and wire inductance. During the slow turn off, the large output pull-down device remains off until the output voltage falls below VEE + 2 Volts, at which time the large pull down device clamps the IGBT gate to VEE.

7、DESAT Fault Detection Blanking Time

The DESAT fault detection circuitry must remain disabled for a short time period following the turn-on of the IGBT to allow the collector voltage to fall below the DESAT threshold. This time period, called the DESAT blanking time is controlled by the internal DESAT charge current, the DESAT voltage threshold, and the external DESAT capacitor.

The nominal blanking time is calculated in terms of external capacitance (CBLANK), FAULT threshold voltage (VDESAT), and DESAT charge current (ICHG) as tBLANK = CBLANK x VDESAT / ICHG. The nominal blanking time with the recommended 100pF capacitor is 100pF * 6.5 V / 240μA = 2.7μsec.

The capacitance value can be scaled slightly to adjust the blanking time, though a value smaller than 100pF is not recommended. This nominal blanking time represents the longest time it will take for the AT332J to respond to a DESAT fault condition. If the IGBT is turned on w hi e the collector and emitter are shorted to the supply rails (switching into a short), the soft shut-down sequence will begin after approximately 3μsec. If the IGBT collector and emitter are shorted to the supply rails after the IGBT is already on, the response time will be much quicker due to the parasitic parallel capacitance of the DESAT diode. The recommended 100pF capacitor should provide adequate blanking as well as fault response times for most applications.

8、Under Voltage Lockout

The AT332J Under Voltage Lockout (UVLO) feature is designed to prevent the application of insufficient gate voltage to the IGBT by forcing the AT332J output low during power-up. IGBTs typically require gate voltages of 15V to achieve their rated VCE(ON) voltage. At gate voltages below13Vtypically, the VCE(ON) voltage increases dramatically, especially at higher currents. At very low gate voltages (below 10V), the IGBT may operate in the linear region and quickly overheat. The UVLO function causes the output to be clamped whenever insufficient operating supply (VCC2) is applied. Once VCC2 exceeds VUVLO+ (the positive-going UVLO thresho d), the UVLO c lamp is released to allow the device output to turn on in response to input signals. As VCC2 is increased from 0V (at some level below VUVLO+), first the DESAT protection circuitry becomes active. As VCC2 is further increased (above VUVLO+), the UVLO c lamp is released. Before the time the UVLO c lamp is released, the DESAT protection is a ready active. Therefore, the UVLO and DESAT Fault detection feature work together to provide seamless protection regardless of supply voltage (VCC2).

9、Active Miller Clamp

A Miller clamp allows the control of the Miller current during a high dV/dt situation and can eliminate the use of a negative supply voltage in most of the applications. During turn-off, the gate voltage is monitored and the clamp output is activated when gate voltage goes below 2V (relative to VEE). The c amp voltage is VOL+2.5V typ for a Miller current up to 1100mA. The clamp is disabled when the LED input is triggered again.

Other Recommended Components

The application circuit in Fig 35 includes an output pull-down resistor, a DESAT pin protection resistor, a FAULT pin capacitor, and a FAULT pin pullup resistor and Active Miller Clamp connection.

Figure 37. Output pull-down resistor

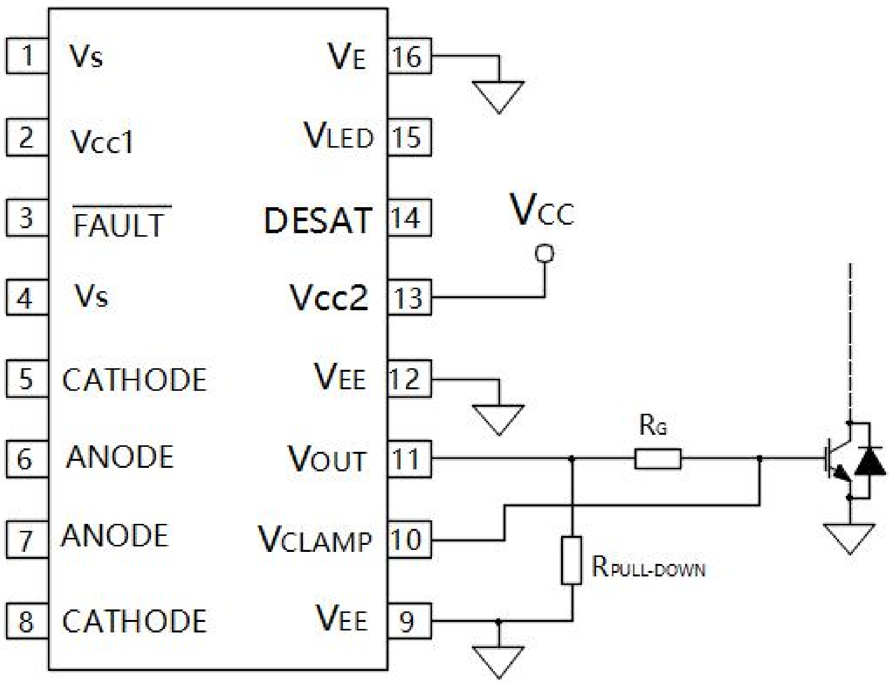
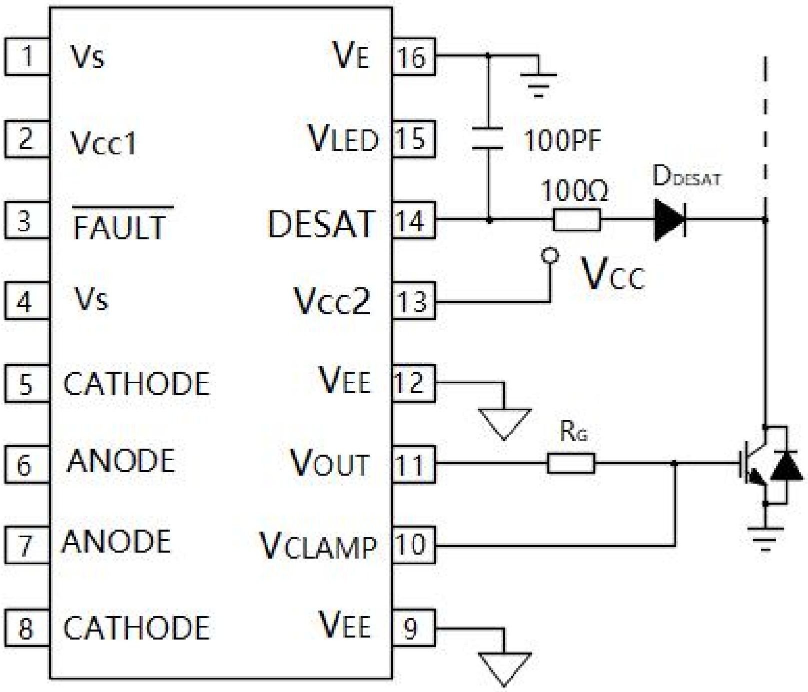


Figure 38. DESAT pin protection



1、Output Pull-Down Resistor

During the output high transition, the output voltage rapidly rises to within 3 diode drops of VCC2 . If the output current then drops to zero due to a capacitive load, the output voltage will slowly rise from roughly VCC2-3(VBE) to VCC2 within a period of several microseconds. To limit the output voltage to VCC2-3(VBE), a pu l-down resistor, RPULL- DOWN between the output and VEE is recommended to sink a static current of several 650μA w hi e the output is high. Pu l-down resistor values are dependent on the amount of positive supply and can be adjusted according to the formula, Rpull-down = [VCC2-3 * (VBE)] / 650μA.

2、DESAT Pin Protection Resistor

The freewheeling of fly back diodes connected across the IGBTs can have large instantaneous forward voltage transients which greatly exceed the nominal forward voltage of the diode. This may result in a large negative voltage spike on the DESAT pin which will draw substantial current out of the driver if protection is not used. To limit this current to levels that will not damage the driver IC, a 100 ohm resistor should be inserted in series with the DESAT diode. The added resistance will not alter the DESAT threshold or the DESAT blanking time.

3、Rapid common mode transients can affect the fault pin voltage while the fault output is in the high state. A 1000pF capacitor should be connected between the fault pin and ground to achieve adequate CMOS noise margins at the specified CMR value of 50kV/μs.

4、Pull-up Resistor on FAULT Pin

The FAULT pin is an open collector output and therefore requires a pull-up resistor to provide a high-level signal. Also the FAULT output can be wire ‘OR’ ed together with other types of protection (e.g. over-temperature, over- voltage, over-current) to alert the microcontroller.

5、 Other Possible Application Circuit (Output Stage)

Fig 39. IGBT drive with negative gate drive, external booster and desaturation detection (VClamp should be connected to VEE when it is not used) VClamp is used as secondary gate discharge path. * indicates component required for negative gate drive topology.

Fig.39

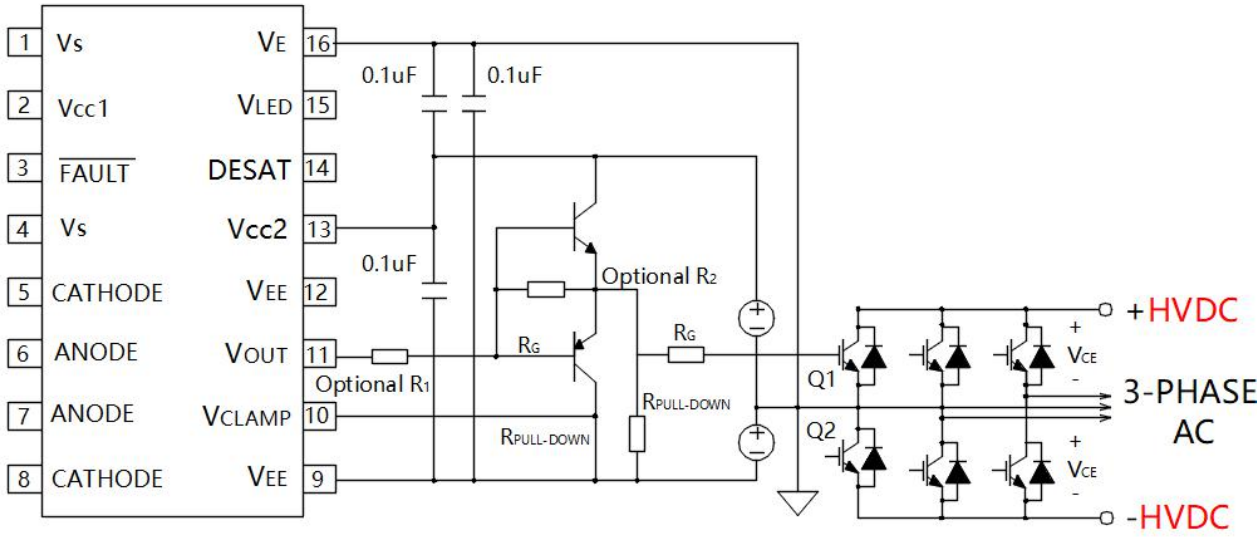
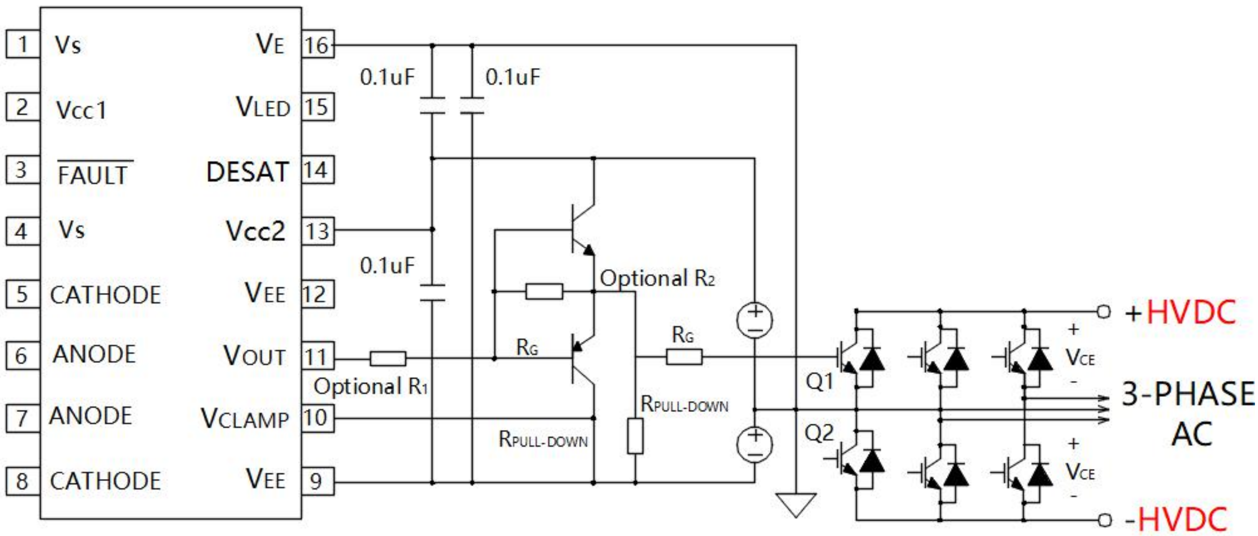


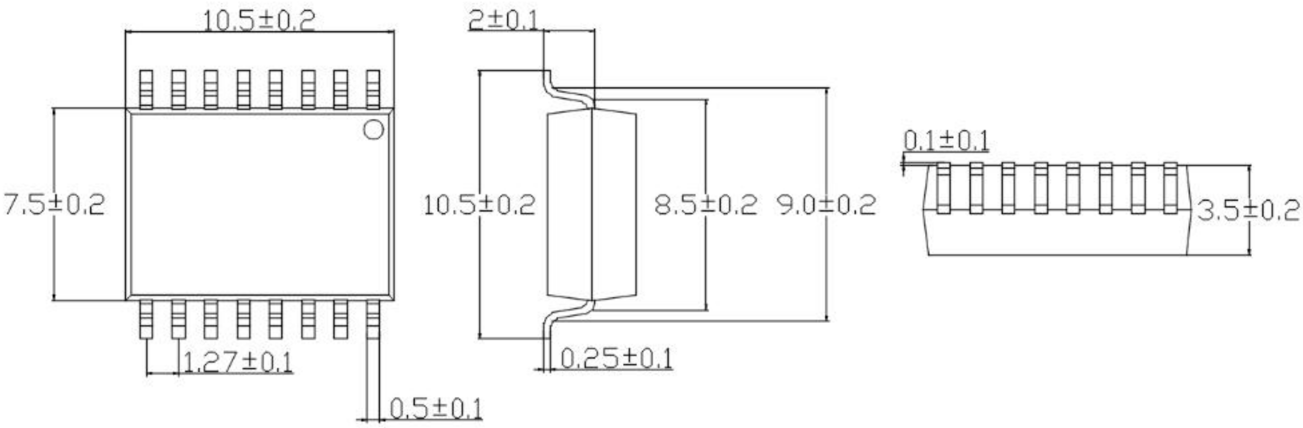
Fig 40. Large IGBT drive with negative gate drive, external booster. VCLAMP control secondary discharge path for higher power application

Fig.40

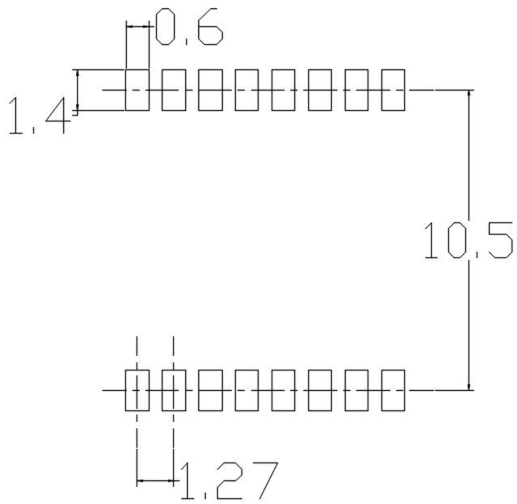


Package Outline Dimensions (unit: mm)

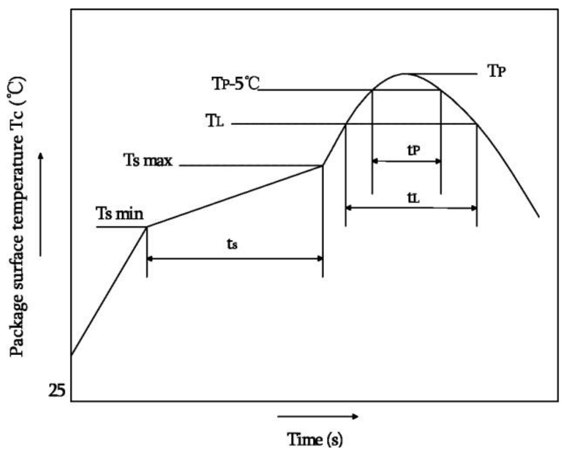
WSOP16



SOLDERING FOOTPRINT (unit: mm)



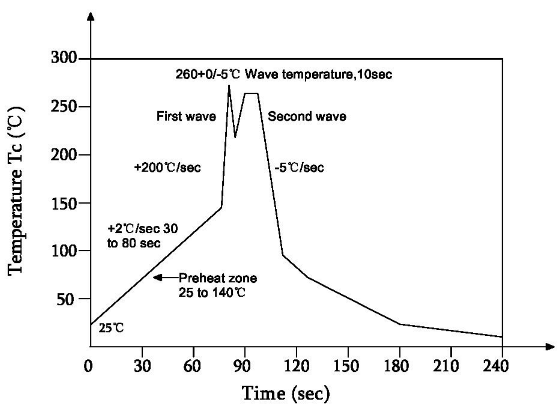
Reflow soldering



	Symbol	Min	Max	Unit
Preheat temperayure	Ts	150	200	℃
Preheat time	ts	60	120	s
Ramp-up ratea(TL to TP)			3	℃/s
Liquidus temperature	TL	217		℃
Time above TL	tL	60	150	s
Peak temperature	Tp		260	℃
Time during which Tc is between (TP-5) and TP	tp		30	s
Ramp-down rate(TP to TL)			6	℃/s

Note:
Reflow soldering is recommended at the temperatures and times shown, no more than three times.

Wave soldering



Profile feature	
Average ramp-up rate	~200℃/s
Heating rate during preheat	1℃/s to 2℃/s typical;4℃/s maximum
Final preheat temperature Ts	~130℃
Preheat time (25℃ to Ts)	>60s
Peak temperature Tp	260℃
Time within peak temperature tp	10s
Ramp-down rate	5℃/s maximum

Soldering with hand soldering iron

A. Hand soldering iron is only used for product rework or sample testing.

B. Hand soldering iron requirements:Temperature:360 ℃+5℃ within 3s.

Packing

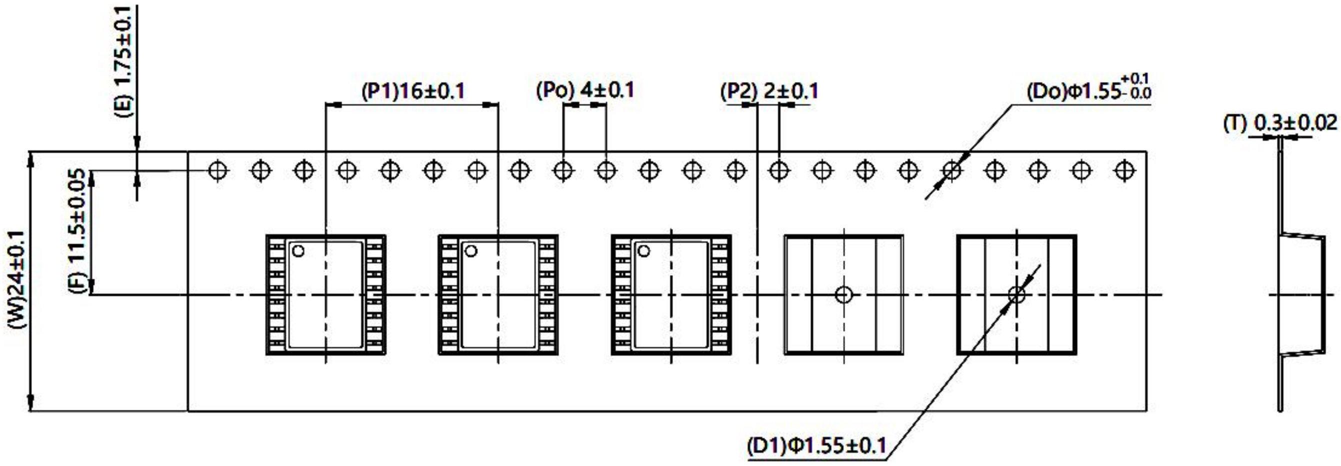
Package Type	Packing Form	Quantity per Tube &Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
WSOP16	Reel (ϕ330mm Blue)	850 pcs/reel	2 reels/box	8 boxes/ctn	450*390*0.1 mm	340*340*75 mm	650*375*365 mm	Leave 50 Spaces at the beginning and 100 Spaces at the end

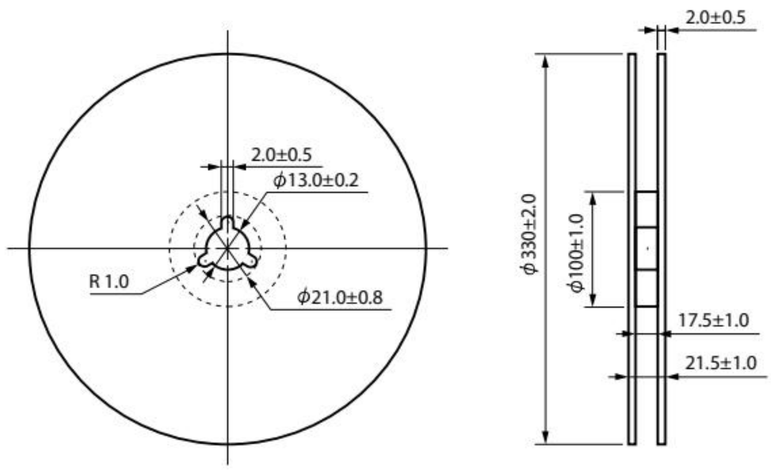
■ WSOP16（Reel）

Qty/reel： 1000pcs. Qty/box： 2000pcs.

Qty/ctn ： 10000pcs.

Schematic： (unit:mm)





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