

Data Sheet



Description

The FSS-343 series Photocopler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications and inverters in power supply system. It contains an LED optically coupled to an integrated circuit with a power output stage.

The 4.0A peak output current is capable of directly driving most IGBTs with ratings up to 1200 V/200 A. For IGBTs with higher ratings, the FSS-343 series can be used to drive a discrete power stage which drives the IGBT gate.

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

Features

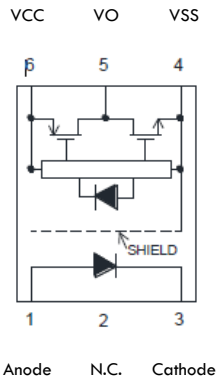
- 4.0 A maximum peak output current
- Rail-to-rail output voltage
- 110 ns maximum propagation delay
- Under Voltage Lock-Out protection (UVLO) with hysteresis
- Wide operating range: 15 to 30 Volts (VCC)
- Guaranteed performance over temperature -40°C ~ +110°C.
- Safety agency certification
 - ✓ UL 1577 approved
 - ✓ VDE approved DIN EN/IEC60747-5-2
 - ✓ CQC – GB4943.1, GB8898



Applications

- IGBT/MOSFET gate drive
- Uninterruptible power supply (UPS)
- Industrial Inverter
- AC/Brushless DC motor drives
- Switching power suppliers

Functional Diagram



Marking



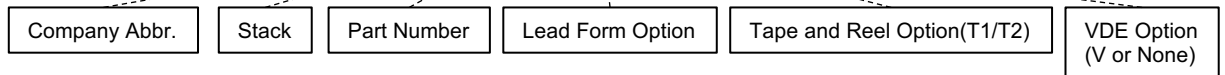
F	: Company Abbr.
YY	: Year date code
WW	: 2-digit work week
343	: Part Number
H	: Factory identification mark
V	: VDE Identification(Optional)

Ordering Information

To order, choose a part number from the part number column. Contact sales representative or authorized distributor for information.

(Example of Item Name)

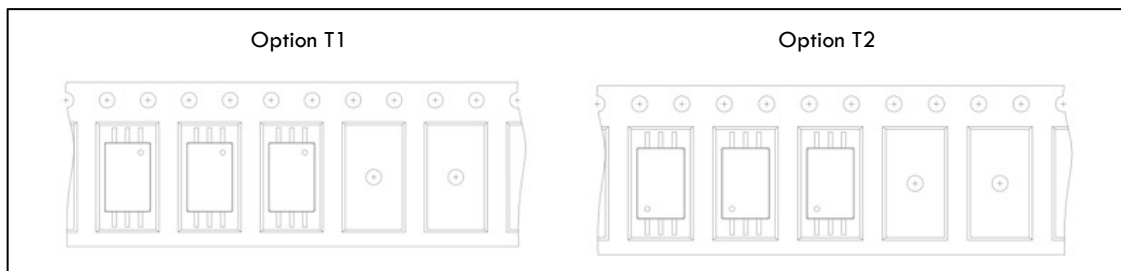
FSS-343(P/W)-(T1)V



- P - 9mm Clearance
 - W - 11mm Clearance
- * Reference Fig 1

Item Name	Lead Form Option	VDE Option	Tape and Reel Option	Packing(MOQ)
FSS-343P-T1V	9mm Clearance	V	Option T1	300K
FSS-343P-T1V				
FSS-343W-T1	11mm Clearance			
FSS-343W-T1				
FSS-343P-T2V	9mm Clearance	V	Option T2	
FSS-343P-T2V				
FSS-343W-T2	11mm Clearance			
FSS-343W-T2				

Fig 1



Truth Table

LED	$V_{CC}-V_{SS}$ (Turn-ON, +ve going)	$V_{CC}-V_{SS}$ (Turn-OFF, -ve going)	VO
Off	0V to 30V	0V to 30V	Low
On	0V to 11.0V	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: A 0.1 μ F bypass capacitor must be connected between Pin 4 and 6.

Absolute Maximum Ratings

PARAMETER	SYMBOL	Min	Max	UNIT	Note
Storage Temperature	T _{stg}	-55	125	°C	-
Operating Temperature	T _{opr}	-40	110	°C	-
Output IC Junction Temperature	T _J	-	125	°C	-
Total Output Supply Voltage	(V _{CC} - V _{SS})	0	35	V	-
Average Forward Input Current	I _F	-	20	mA	-
Reverse Input Voltage	V _R	-	5	V	-
"High" Peak Output Current	I _{OH} (PEAK)		4.0	A	1
"Low" Peak Output Current	I _{OL} (PEAK)		4.0	A	1
Output Voltage	V _O (PEAK)	-0.5	V _{CC}	V	-
Power Dissipation	P _I	-	45	mW	-
Output IC Power Dissipation	P _O	-	700	mW	-
Lead Solder Temperature	T _{sol}	-	260	°C	-

Note: 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 1: Exponential waveform. Pulse width \leq 10 μ s, f \leq 15 kHz

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Temperature	T_A	-40	110	°C
Supply Voltage	V_{CC}	15	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	-3.0	0.8	V

Electrical Specifications

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Input Forward Voltage	VF	1.6	1.9	2.4	V	IF=10mA	-
Input Forward Voltage Temperature Coefficient	$\Delta VF / \Delta T$	-	-1.237	-	mV/°C	IF=10mA	-
Input Reverse Voltage	BVR	5	-	-	V	IR = 10 μ A	-
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 = 30 V, VO < 5V	-
Input Capacitance	CIN	-	60	-	pF	f = 1 MHz, VF = 0 V	-
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	1.70	3	mA	IF = 10 mA, VCC = 30V, VO = Open, Rg = 10 Ω , Cg = 6 nF	-
Low Level Supply Current	ICCL	-	2.11	3	mA	IF = 0 mA, VCC = 30V, VO = Open, Rg = 10 Ω , Cg = 6 nF	-
High level output current	IOH	3.0	-	-	A	IF = 10 mA, VCC = 30V VO = VCC - 4	1
Low level output current	IOL	3.0	-	-	A	IF = 0 mA, VCC = 30V VO = VSS + 4	1
High level output voltage	VOH	29.7	29.88	-	V	IF = 10mA, IO = -100mA	2,3
Low level output voltage	VOL	-	0.1	0.3	V	IF = 0 mA, IO = 100 mA	-
UVLO Threshold	VUVLO+	11.0	12.6	13.5	V	VO > 5V, IF = 10 mA	-
	VUVLO-	9.5	11.2	12.0	V	VO < 5V, IF = 10 mA	-

All Typical values at TA = 25°C and VCC – VSS = 30 V, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Maximum pulse width = 10 μ s.

Note 2: 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 3: Maximum pulse width = 1 ms.

Switching Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Note
Propagation Delay Time to High Output Level	t_{PLH}	-	61.3	110	ns	Rg = 10 Ω , Cg = 25 nF, f = 10kHz, Duty Cycle = 50% IF = 10mA, VCC = 30V	-
Propagation Delay Time to Low Output Level	t_{PHL}	-	74.5	110			-
Pulse Width Distortion	PWD	-	22	70			-
Propagation Delay Difference Between Any Two Parts	PDD ($t_{PHL} - t_{PLH}$)	-100	-	+100			-
Output Rise Time (10 to 90%)	t_r	-	20	-			-
Output Fall Time (90 to 10%)	t_f	-	15	-			-
Common mode transient immunity at high level output	$ CM_H $	20	40	-	kV/ μ s	IF= 7 to 16mA VCC= 30V, TA= 25 °C, VCM= 1kV	1,2
Common mode transient immunity at low level output	$ CM_L $	20	40	-	kV/ μ s	IF=0mA VCC= 30V, TA= 25 °C, VCM= 1kV	1,3

All Typical values at TA = 25°C and VCC – VSS = 30 V, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Pin 2 needs to be connected to LED common.

Note 2: Common mode transient immunity in the high state is the maximum tolerable dVCM/dt of the common mode pulse, VCM, to assure that the output will remain in the high state (meaning VO > 15.0V).

Note 3: Common mode transient immunity in a low state is the maximum tolerable dVCM/dt of the common mode pulse, VCM, to assure that the output will remain in

a low state (meaning VO < 1.0V).

Isolation Characteristic

Parameter	Symbo	Device	Min.	Typ.	Max.	Unit	Test Condition	Note
Withstand Insulation Test Voltage	V_{ISO}	FSS-343P	5000	-	-	V	RH ≤ 40%-60%, t = 1 min, T _A = 25 °C	1,2
		FSS-343W						
Input-Output Resistance	$R_{I.O}$	-	-	10 ¹²	-	Ω	V _{I.O} = 500V DC	1

All Typical values at TA = 25°C and VCC – VSS = 30 V, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Device is considered a two terminal device: pins 1, 2, 3 are shorted together and pins 4, 5, 6 are shorted together.

Note 2: According to UL1577, each photocoupler is tested by applying an insulation test voltage 6000VRMS for one second. This test is performed before the 100% production test for partial discharge.

Typical Performance Curves & Test Circuits

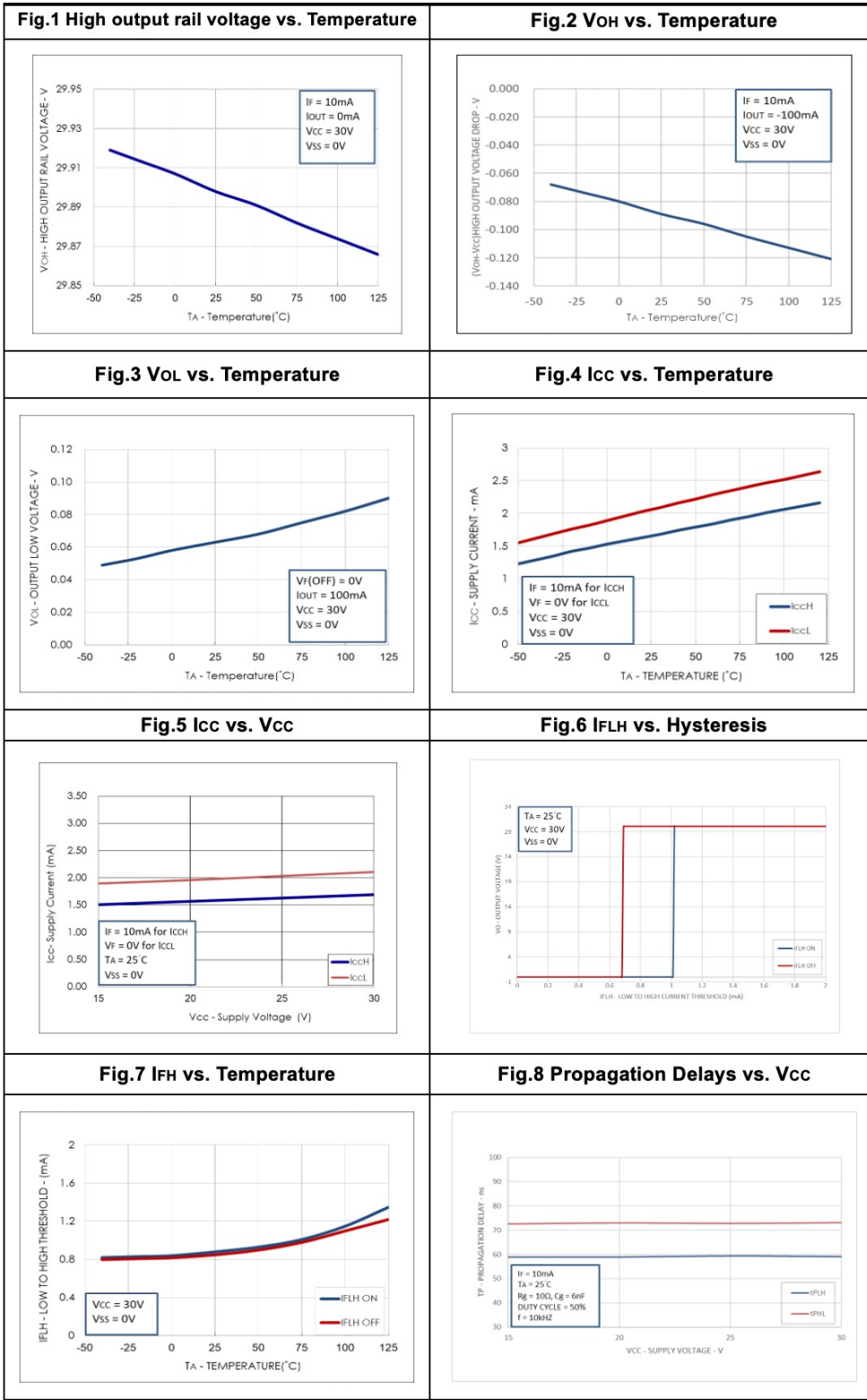


Fig.9 Propagation Delays vs. I_f

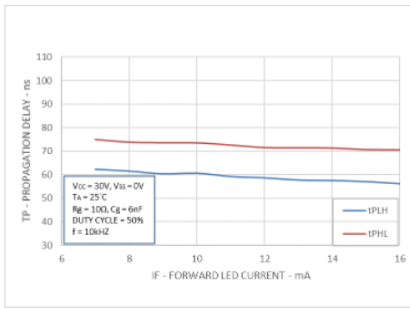


Fig.10 Propagation Delays vs. Temperature

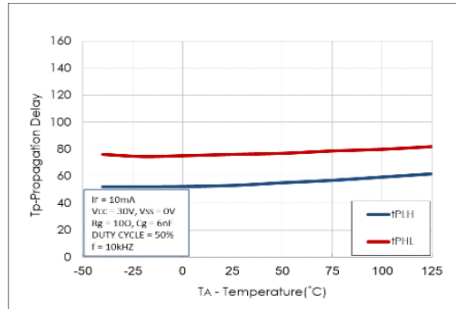


Fig.11 Propagation Delays vs. R_g

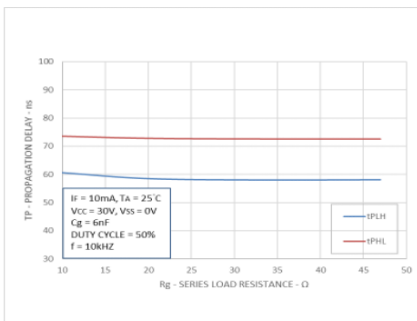


Fig.12 Propagation Delays vs. C_g

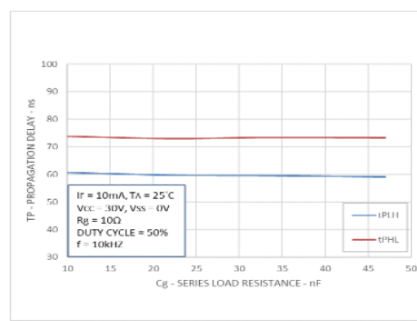


Fig.13 Input Current vs. Forward Voltage

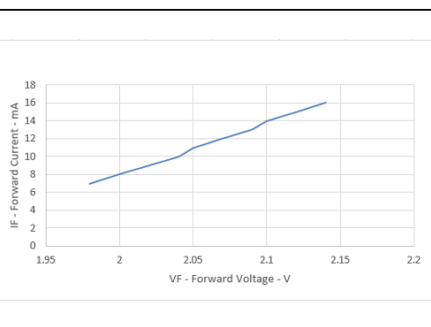


Fig.14 I_{OH} Test Circuit

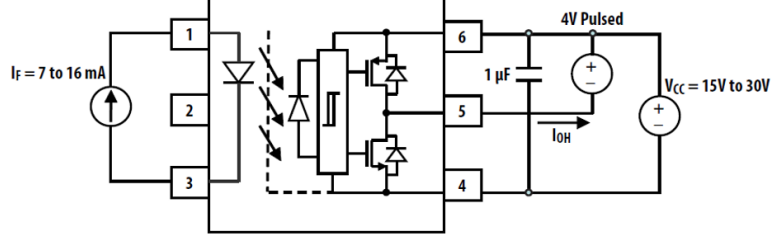


Fig.15 I_{OL} Test Circuit

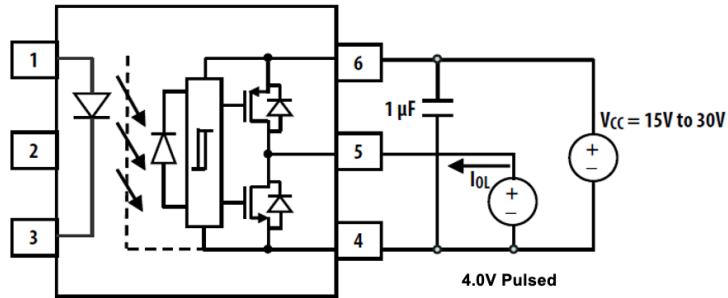


Fig.16 V_{OH} Test Circuit

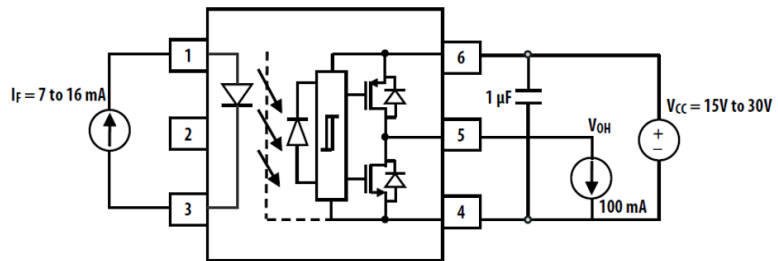


Fig.17 V_{OL} Test Circuit

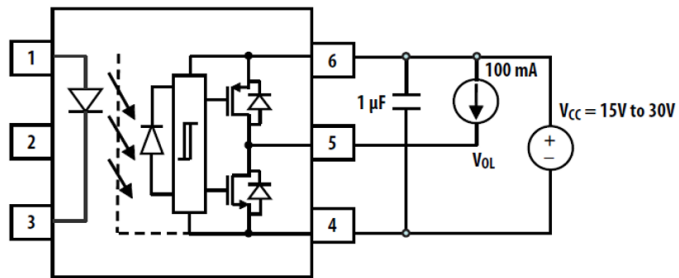


Fig.18 I_{FLH} Test Circuit

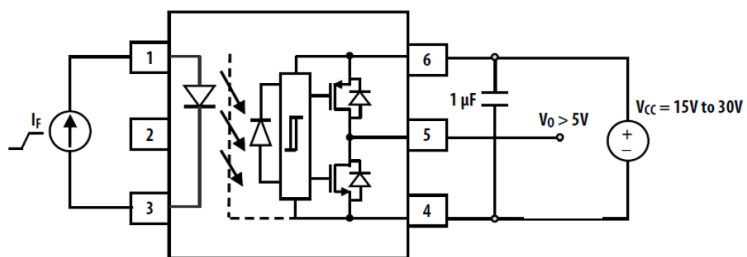


Fig.19 UVLO Test Circuit

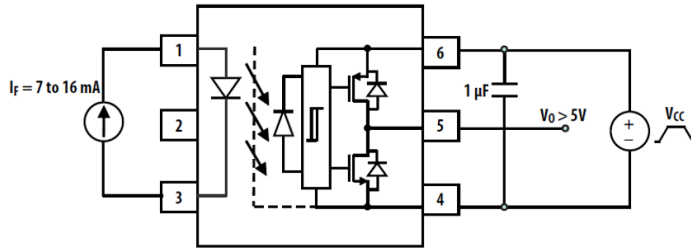


Fig.20 tPHL, tPLH, tr and tf Test Circuit and Waveforms

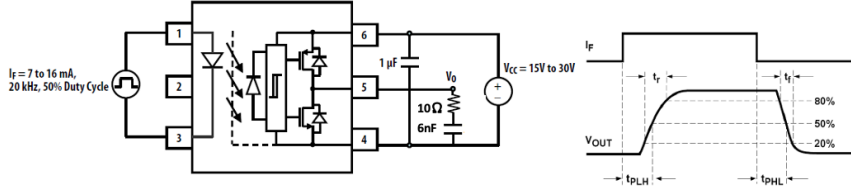
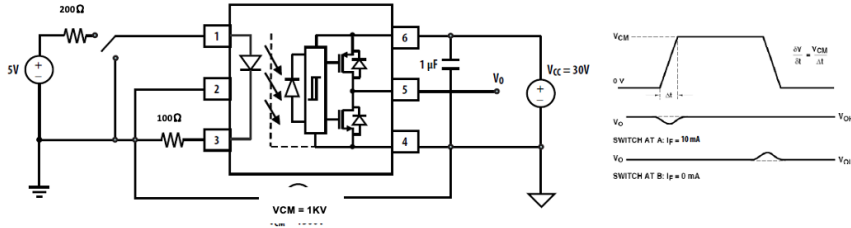
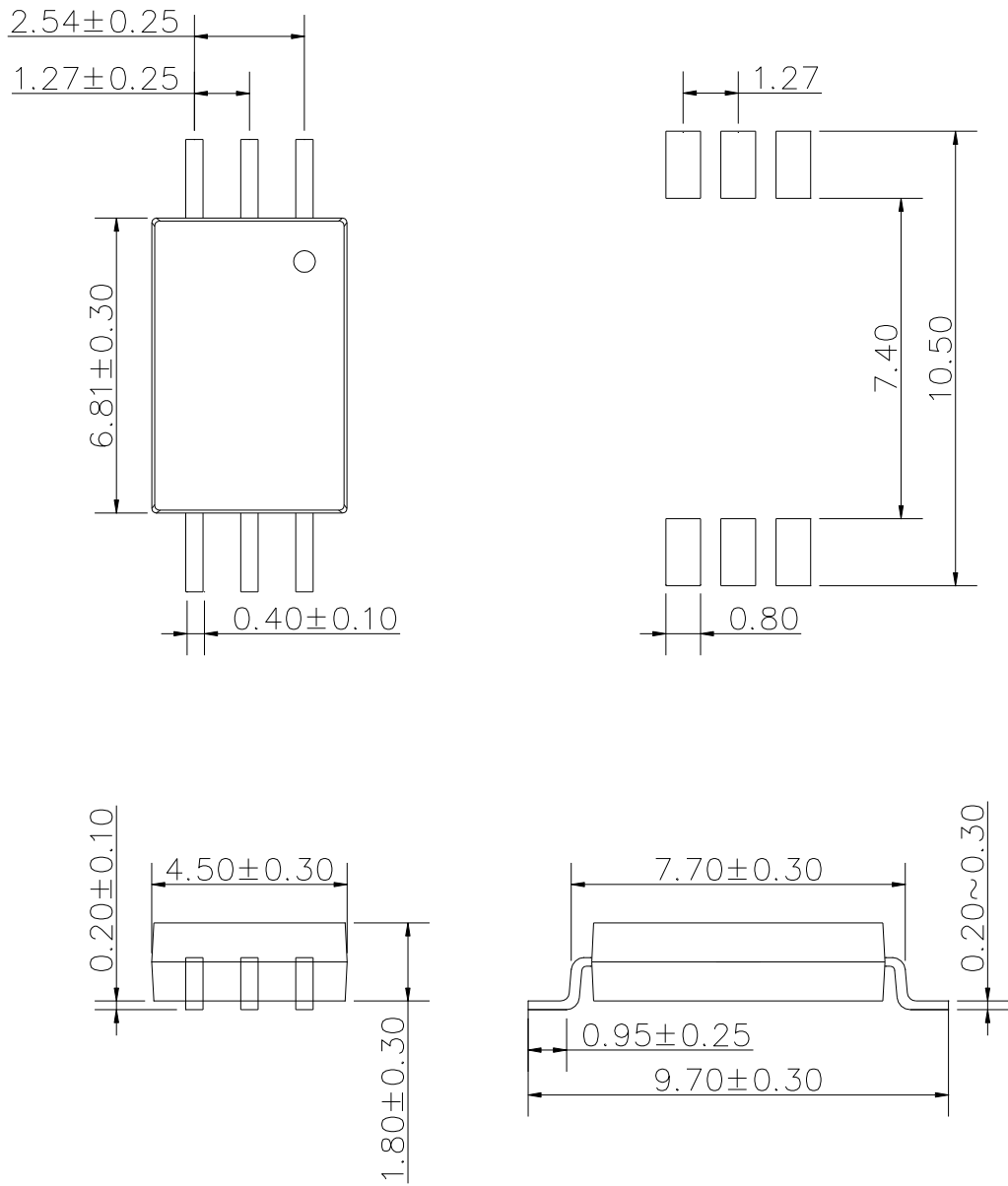


Fig.21 CMR Test Circuit with Split Resistors Network and Waveforms



Package Outline Drawings

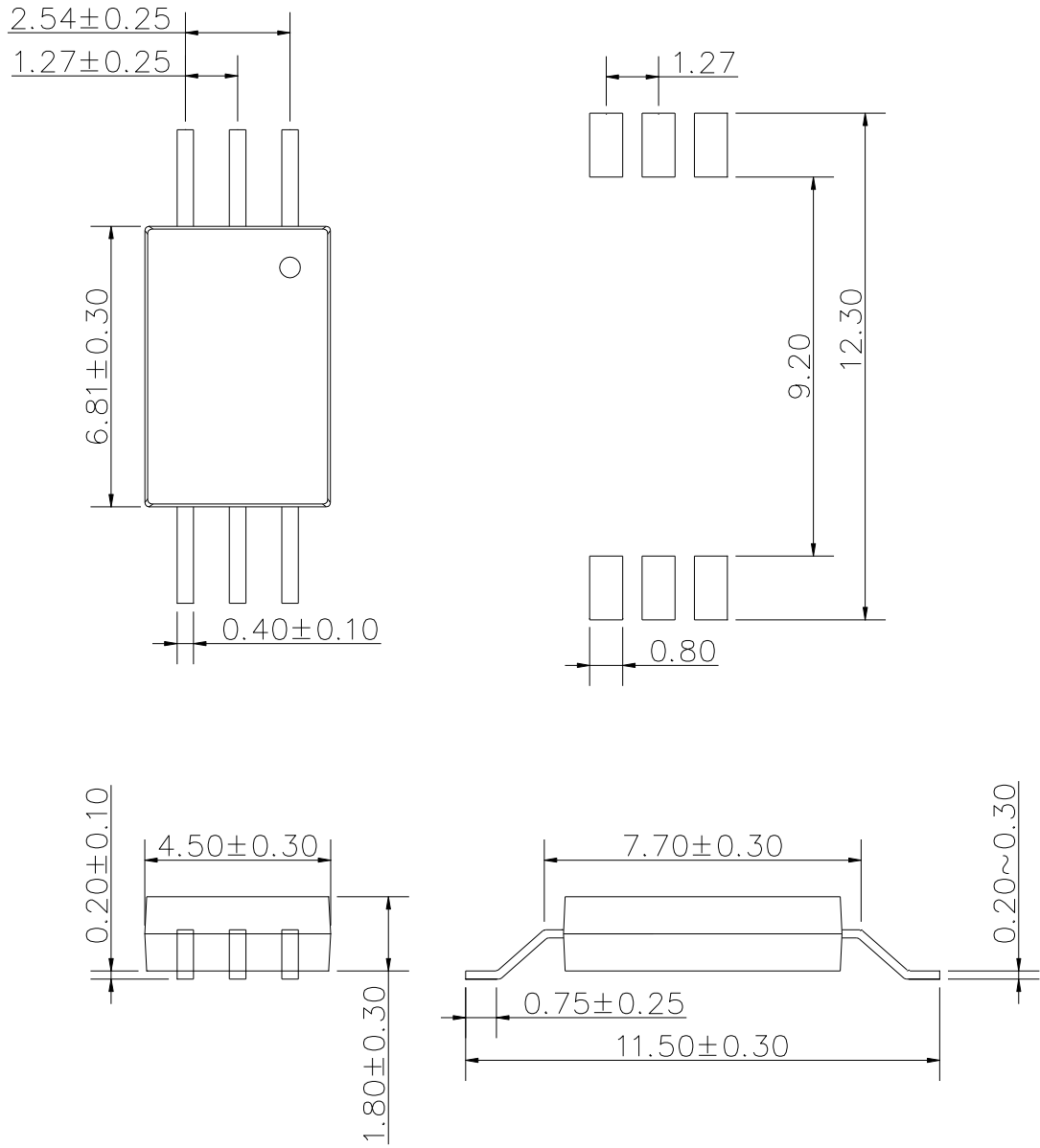
Surface Mount Lead Forming - P type Dimension



Dimensions in mm unless otherwise stated

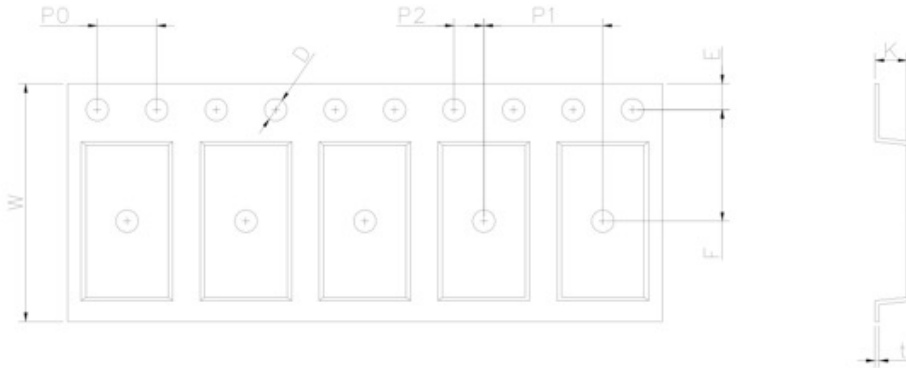
Package Outline Drawings

Surface Mount Lead Forming - W type Dimension



Dimensions in mm unless otherwise stated

Taping Dimensions



Dimension Symbol	D	E	F	P0	P1	P2	t	W	K
P type	1.5±0.1	1.75±0.1	7.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	0.3±0.1	16.0±0.3	2.15±0.1
Dimension (mm)									
W type	1.5±0.1	1.75±0.1	11.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	0.3±0.1	24.0±0.3	2.52±0.1
Dimension (mm)									

Dimensions in mm unless otherwise stated

-
- Foxconn / SOCLE is continually improving the quality, reliability, function and design. Foxconn / SOCLE reserves the right to make changes without further notices.
 - The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
 - Foxconn / SOCLE makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Foxconn / SOCLE disclaims any and all liability arising out of the application or use of any product, including without limitation special, consequential or incidental damages.
 - The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
 - This product is not intended to be used for military, aircraft, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
 - Please contact Foxconn / SOCLE sales agent for special application request.
 - Immerge unit's body in solder paste is not recommended.
 - Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Foxconn / SOCLE's terms and conditions of purchase, including but not limited to the warranty expressed therein.
 - Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.

FOXCONN[®]



Foxconn Technology Group

SOCLE Technology
www.socle-tech.com