International **I⊙R** Rectifier

IPS7071GPbF

PROTECTED HIGH SIDE SWITCH

Features

- Over temperature shutdown (with auto-restart)
- Short circuit protection (current limit)
- Active clamp
- Open load detection
- Logic ground isolated from power ground
- ESD protection
- Ground loss protection
- Status feedback

Description

The IPS7071GPbF is a fully protected five terminal high side switch with built in short circuit, over-temperature, ESD protection, inductive load capability and diagnostic feedback. The output current is limited at Ilim value. Current limitation is activated until the thermal protection acts. The over-temperature protection turns off the device if the junction temperature exceeds Tshutdown. It will automatically restart after the junction has cooled 7°C below Tshutdown. A diagnostic pin is provided for status feedback of short circuit, over-temperature and open load detection. The double level shifter circuitry allows large offsets between the logic ground and the load.

Product Summary

Rds(on)	110mΩ max.
Vclamp	70V
I Limit	5A
Open load	3V

Package

SO8
IPS7071GPbF

Typical Connection

International
IƟR Rectifier
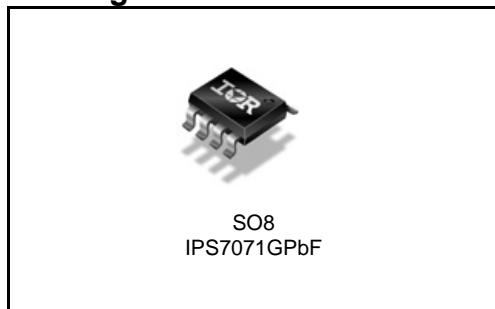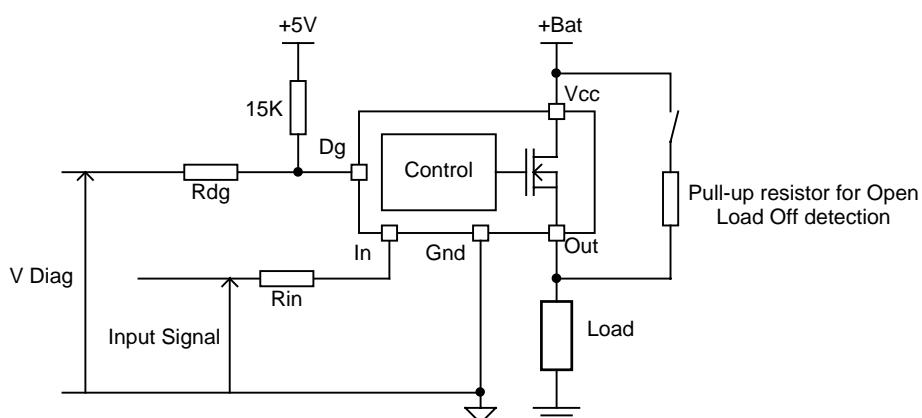
Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are referenced to Ground lead. (Tambient=25°C unless otherwise specified).

Symbol	Parameter	Min.	Max.	Units
Vout	Maximum output voltage	Vcc-65	Vcc+0.3	
Voffset	Maximum logic ground to load ground offset	Vcc-65	Vcc+0.3	
Vin	Maximum input voltage	-0.3	5.5	V
Vcc max.	Maximum Vcc voltage	—	65	
Vcc cont.	Maximum continuous Vcc voltage	—	35	
Iin max.	Maximum IN current	-1	10	mA
Idg max.	Maximum diagnostic output current	-1	10	
Vdg	Maximum diagnostic output voltage	-0.3	5.5	V
Pd	Maximum power dissipation (internally limited by thermal protection) Rth=100°C/W	—	1.25	W
Isd cont.	Maximum continuous diode current (Rth=100°C/W)	—	1.8	A
ESD1	Electrostatic discharge voltage (Human body) 100pF, 1500Ω	—	4	kV
ESD2	Electrostatic discharge voltage (Machine Model) C=200pF,R=0Ω,L=10µH	—	0.5	
Tj max.	Max. storage & operating temperature junction temperature	-40	+150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
Rth1	Thermal resistance junction to ambient IPS7071G	100	—	°C/W

Recommended Operating Conditions

These values are given for a quick design. For operation outside these conditions, please consult the application notes.

Symbol	Parameter	Min.	Max.	Units
VIH	High level input voltage	4	5.5	
VIL	Low level input voltage	-0.3	0.9	
Iout	Continuous drain current, Tamb=85°C, Tj=125°C, Vin=5V, Rth=100°C/W	—	1.5	A
Rin	Recommended resistor in series with IN pin	4	10	
Rdgs	Recommended resistor in series with DG pin	10	20	kΩ
Rol	Recommended pull-up resistor for open load detection	5	100	

IPS7071GPbF

Static Electrical Characteristics

Tj=25°C, Vcc=14V (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Rds(on)	ON state resistance Tj=25°C	—	80	110	mΩ	Vin=5V, Iout=2.5A
	ON state resistance Tj=150°C (1)	—	130	175		Vin=5V, Iout=2.5A
	ON state resistance Tj=25°C, Vcc=6.5V	—	90	120		Vin=5V, Iout=2.5A
Vcc op.	Operating voltage range	6	—	35	V	
V clamp 1	Vcc to Out clamp voltage 1	65	70	—		Iout=10mA (see Fig. 1)
V clamp 2	Vcc to Out clamp voltage 2 (1)	—	70	75		Iout=1A (see Fig. 1)
Vf	Body diode forward voltage	—	1	1.35		Iout= 2.5A
Icc Off	Supply current when Off	—	2.5	10	µA	Vin=0V, Vout=0V
Icc On	Supply current when On	—	2.5	3.5	mA	Vin=5V
Iout@0V	Output leakage current	—	1.1	10	µA	Vout=0V
Iout@6V	Output leakage current	—	20	—		Vout=6V
Idg leakage	Diagnostic output leakage current	—	—	10		Vdg=5.5V
Vdgl	Low level diagnostic output voltage	—	0.2	0.3	V	Idg=1.6mA
Vih	Input high threshold voltage	—	2.5	3.5		
Vil	Input low threshold voltage	1	2	—		
In hys	Input hysteresis	0.15	0.4	1		
UV high	Under voltage high threshold voltage	—	5	5.9		
UV low	Under voltage low threshold voltage	3.4	4.5	—		
UV hys	Undervoltage hysteresis	0.1	0.8	1.5		
Iin On	Input current when device is On	—	40	80	µA	Vin=5V

(1) Guaranteed by design

Switching Electrical Characteristics

Vcc=14V, Resistive load=14Ω, Vin=5V, Tj=25°C

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Tdon	Turn-on delay time	—	11	35	µs	See Fig. 3
Tr1	Rise time to Vout=Vcc-5V	—	7	40		
Tr2	Rise time to Vout=0.9 x Vcc	—	15	50		
dV/dt (On)	Turn On dV/dt	—	1.3	4	V/µs	
EOn	Turn On energy	—	75	—	µJ	
Tdoff	Turn-off delay time	—	23	45	µs	
Tf	Fall time to Vout=0.1 x Vcc	—	6	25		
dV/dt (Off)	Turn Off dV/dt	—	2	6	V/µs	
EOff	Turn Off energy	—	25	—	µJ	
Tdiag	Vout to Vdiag propagation delay	—	15	—	µs	See Fig. 4 and Fig. 12

International
IꞍR Rectifier

Protection Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
Ilim	Internal current limit (2)	2	5	9	A	Vout=0V
Tsd+	Over temperature high threshold	150(2)	165	—	°C	See Fig. 2
Tsd-	Over temperature low threshold	—	158	—		
Vsc	Short-circuit detection voltage(3)	2	3	4	V	
Vopen load	Open load detection threshold	2	3	4		

(2) Guaranteed by design
(3) Reference to Vcc

Truth Table

Operating Conditions	IN	OUT	DG pin
Normal	H	H	H
Normal	L	L	L
Open Load	H	H	H
Open Load [3]	L	H	H
Short circuit to Gnd	H	L (limiting)	L
Short circuit to Gnd	L	L	L
Over-temperature	H	L (cycling)	L
Over-temperature	L	L	L

[3] With a pull-up resistor connected between the output and Vcc.

Lead Assignments

8 7 6 5

1- Out
2- Gnd
3- DG
4- In
5-6-7-8 Vcc

1 2 3 4
SO8
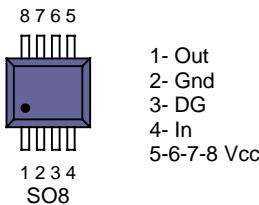
Functional Block Diagram

All values are typical
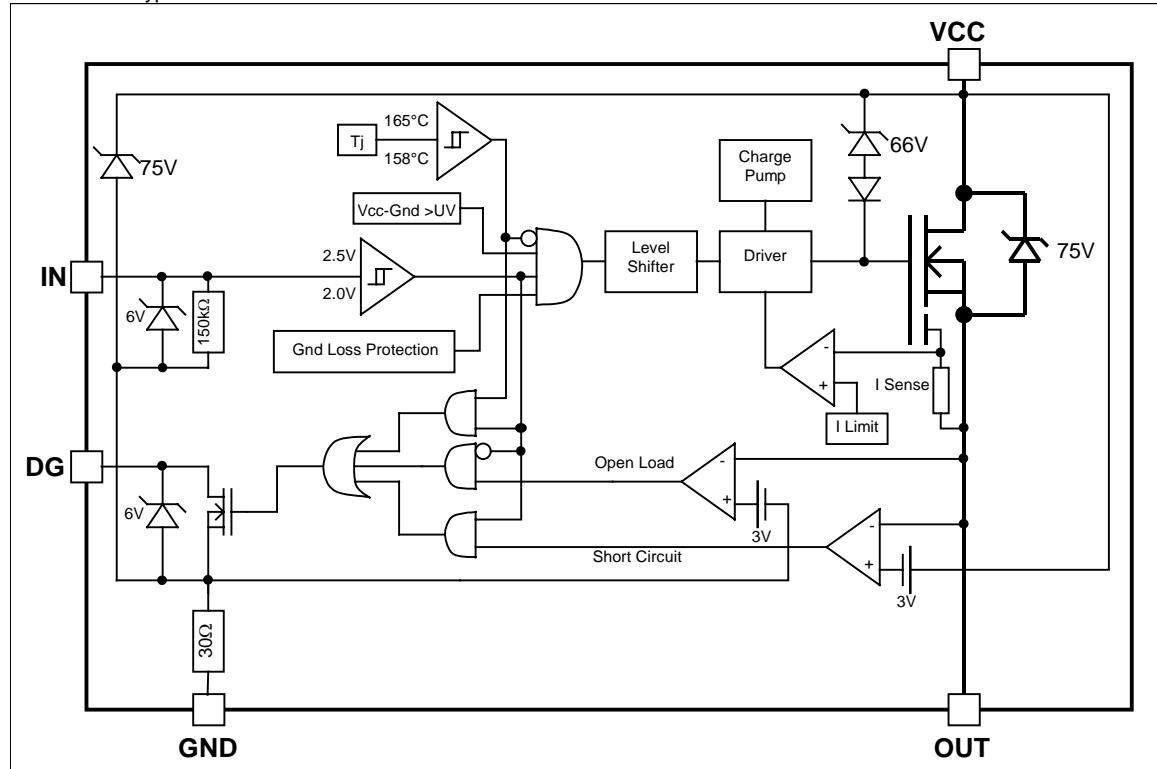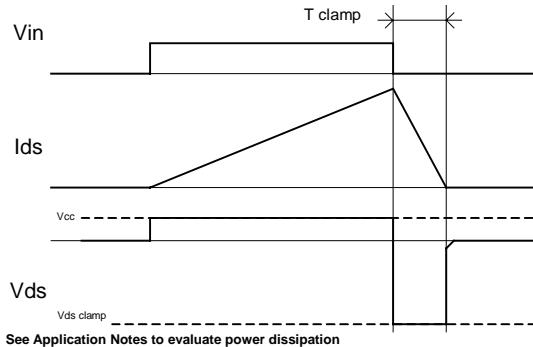
Figure 1 – Active clamp waveforms
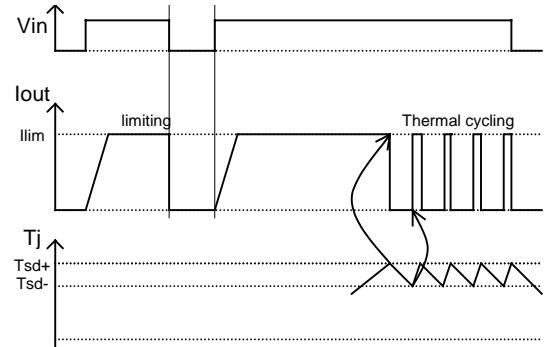
Figure 2 – Protection timing diagram
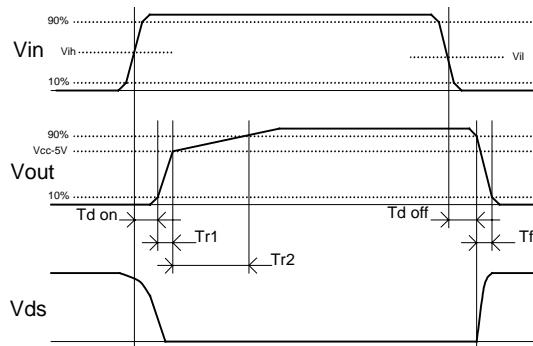
Figure 3 – Switching times definition
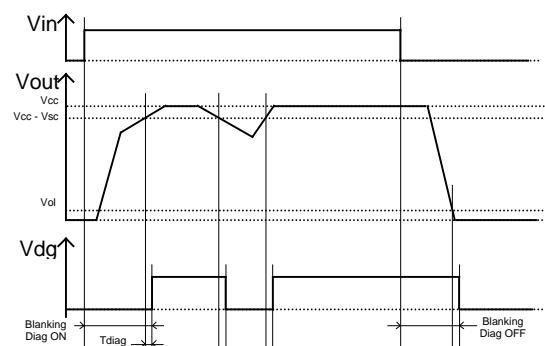
Figure 4 – Diagnostic delay definition
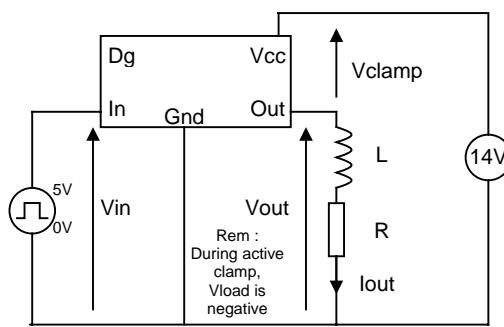
Figure 5 – Active clamp test circuit
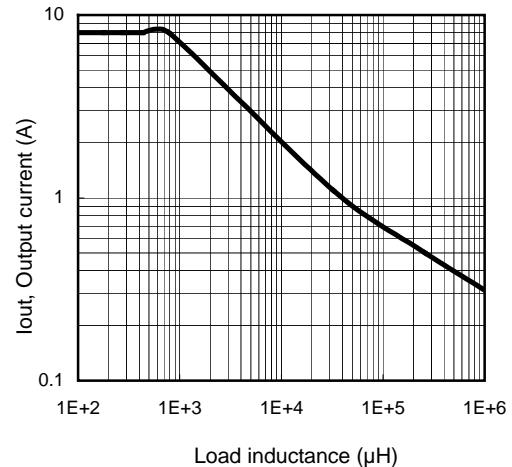
Load inductance (µH)

**Figure 6 – Max. Output current (A) Vs Load
inductance (µH)**

Tamb, Ambient temperature (°C)
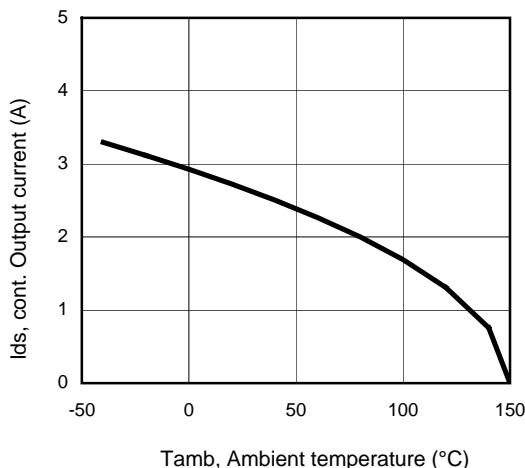
**Figure 7 – Max. ouput current (A)
Vs Ambient temperature (°C)**
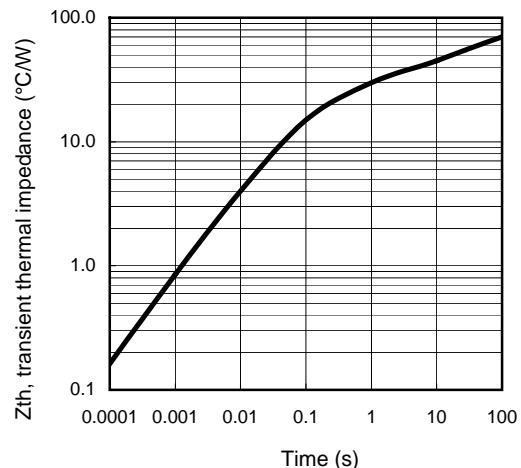
Time (s)

**Figure 8 – Transient thermal impedance (°C/W)
Vs time (s)**
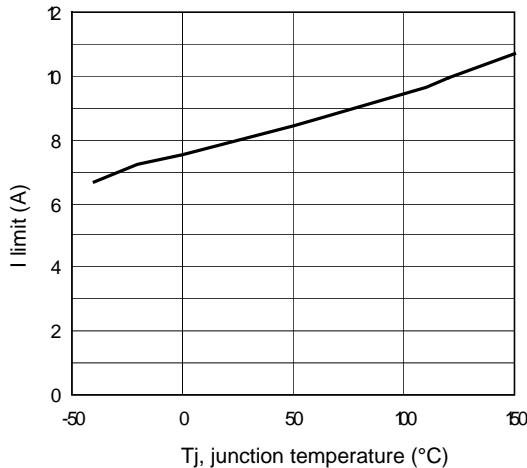
Figure 9 –I limit (A)
Vs junction temperature (°C)
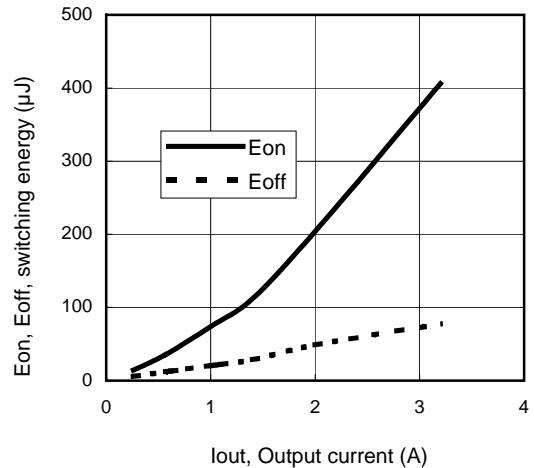
**Figure 10 – Switching energy (μJ)**
**Vs Output current (A)**
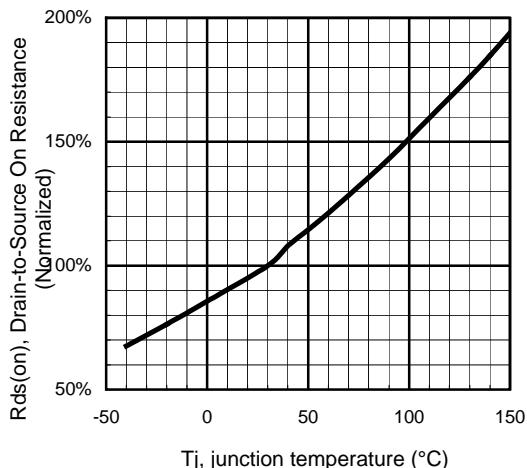
Figure 11 - Normalized Rds(on) (%) Vs Tj (°C)
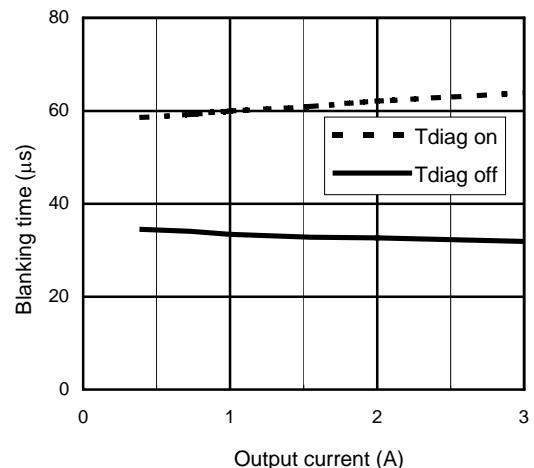
Figure 12 – Diagnosis Blanking time (μs)
Vs Output current (A)

IPS7071GPbF

Icc on/ Icc off, supply current (μA)

1.E+4

1.E+3

1.E+2

1.E+1

1.E+0

0   5   10   15   20   25   30   35

Vcc, power supply voltage (V)

Icc on
Icc off

Figure 13 – Icc on/ Icc off (μA) Vs Vcc (V)

Icc on/ Icc off, supply current (μA)

1.E+4

1.E+3

1.E+2

1.E+1

1.E+0

-50   0   50   100   150

Tj, junction temperature (°C)

Icc on
Icc off

Figure 14 – Icc on/ Icc off (μA) Vs Tj (°C)

International IGR Rectifier
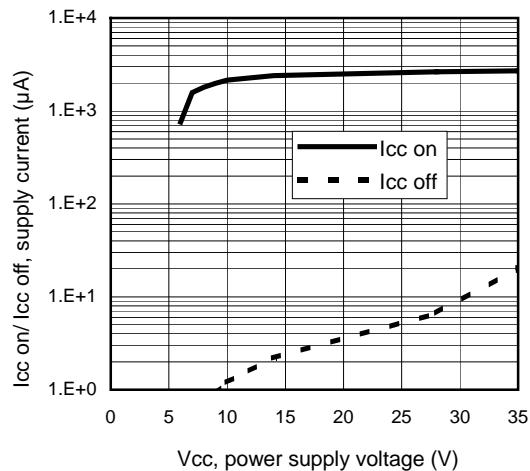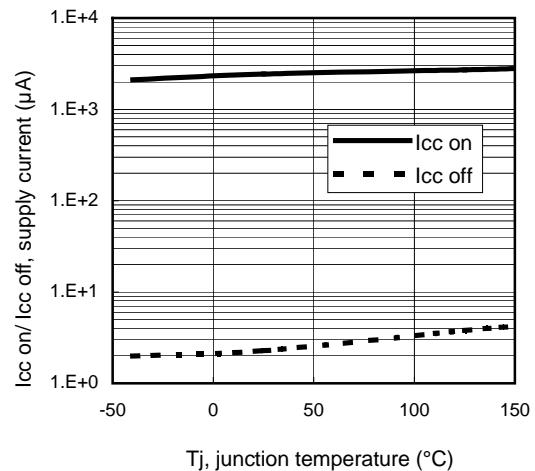
Case Outline – SO8

Dimensions are shown in millimeters (inches)
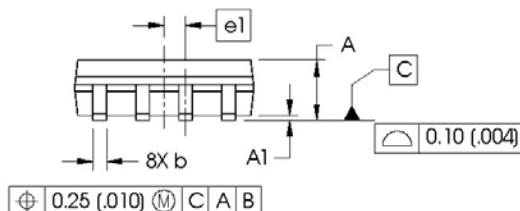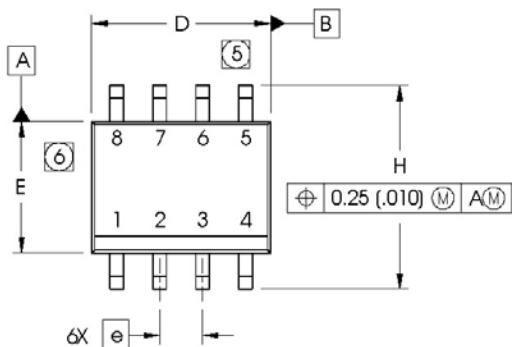
| DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°
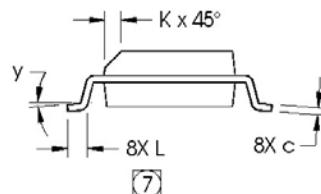
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.010).
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT

IPS7071GPbF
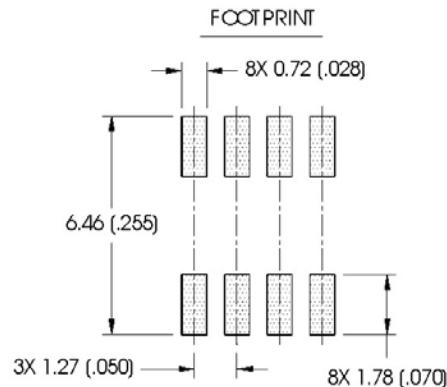
Tape & Reel - SO8
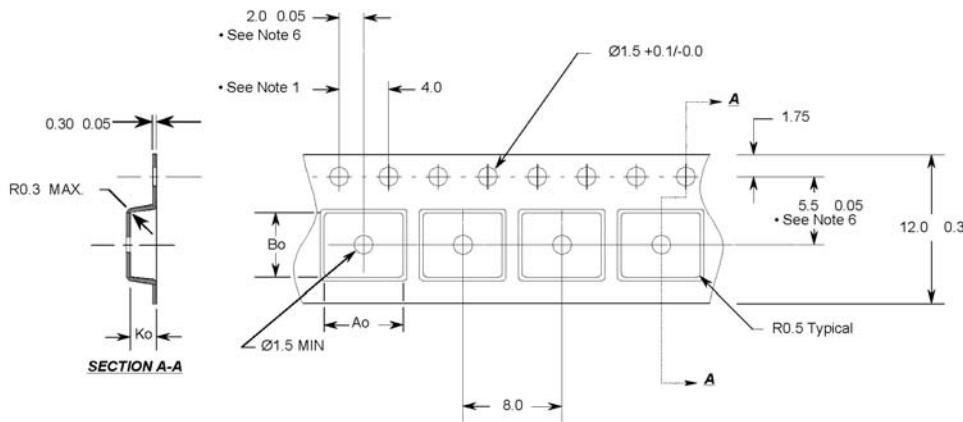
Notes:
1. 10 sprocket hole pitch cumulative tolerance   0.2
2. Camber not to exceed 1mm in 100mm
3. Material: Black Conductive Advantek Polystyrene
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Ao = 6.4 mm
Bo = 5.2 mm
Ko = 2.1 mm

- All Dimensions in Millimeters -

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245 Tel: (310) 252-7105
Data and specifications subject to change without notice
SO8 is MSL2 qualified
This product has been designed and qualified for the Automotive [Q100] market.   6/24/2007

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Power Switch ICs - Power Distribution *category:*

Click to view products by Infineon *manufacturer:*

Other Similar products are found below :

TCK111G,LF(S FPF1018 DS1222 TCK2065G,LF SZNCP3712ASNT3G MIC2033-05BYMT-T5 MIC2033-12AYMT-T5 MIC2033-05BYM6-T5 SLG5NT1437VTR SZNCP3712ASNT1G DML1008LDS-7 KTS1670EDA-TR KTS1640QGDV-TR KTS1641QGDV-TR U6513A MIC2012YM-TR MP5095GJ-P TPS2021IDRQ1 TPS2104DBVR TPS22958NDGKR MIC2098-1YMT-TR MIC94062YMT TR MIC2015-1.2YM6 TR MIC2075-2YM MIC94068YML-TR SIP32461DB-T2-GE1 NCP335FCT2G FPF1504UCX TCK105G,LF(S AP2411S-13 AP2151DSG-13 AP2172MPG-13 MIC94094YC6-TR MIC94093YC6-TR MIC94064YC6-TR MIC94061YMT-TR MIC2505-1YM MIC94085YFT-TR MIC94042YFL-TR MIC2005-1.2YM6-TR SIP32510DT-T1-GE3 NCP333FCT2G BTS3050TFATMA1 NCP331SNT1G TPS2092DR TPS2063DR MIC2008YML-TR MIC94084YFT-TR MIC2040-1YMM DIO1280WL12