

IS-1845ASRH, IS-1845ASEH

Single Event Radiation Hardened High Speed, Current Mode PWM

FN9001
Rev.7.01
Feb 16, 2022

The [IS-1845ASRH](#), [IS-1845ASEH](#) are designed to be used in switching power supplies operating in current-mode. Every other rising edge of the on-chip oscillator turns on the output. Turn-off is controlled by the current sense comparator and occurs when the sensed current reaches a peak controlled by the error amplifier. Turn-off can also be triggered by the end of the oscillator period. These devices feature a single output operating from zero to less than 50% duty cycle.

Constructed with Renesas Rad Hard Silicon Gate (RSG) dielectrically isolated BiCMOS process, these devices are immune to single event latch-up and have been specifically designed to provide a high level of immunity to single event transients. All specified parameters are ensured and tested for 300krad(Si) total dose performance at a high dose rate and 50krad(Si) total dose at a low dose rate.

Detailed Electrical Specifications for these devices are contained in the SMD 5962-01509.

Features

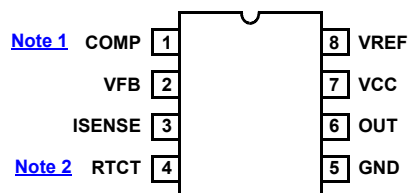
- Electrically Screened to DSCC SMD # [5962-01509](#)
- QML Qualified per MIL-PRF-38535 Requirements
- Radiation acceptance testing - IS-1845ASRH
 - High Dose Rate 300krad(Si) (Max)
- Radiation acceptance testing - IS-1845ASEH
 - High Dose Rate 300krad(Si) (Max)
 - Low Dose Rate 50krad(Si) (Max)
- SEE hardness (see SEE report for details)
 - SEL Immune Dielectrically Isolated
 - SEU Immune 35MeV/mg/cm²
 - SEU Cross-Section at 89MeV/mg/cm² 5x10⁻⁶cm²
- Low Start-up Current 100µA (Typ)
- Fast Propagation Delay 80ns (Typ)
- Supply Voltage Range 12V to 20V
- High Output Drive 1A (Peak, Typ)
- Undervoltage Lockout 8.8V Start (Typ), 8.2V Stop (Typ)

Applications

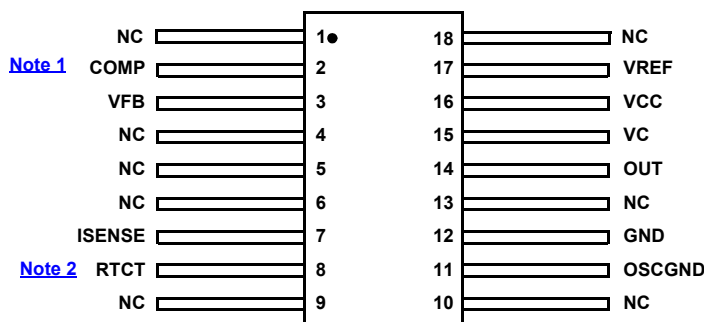
- Current-Mode Switching Power Supplies
- Control of High Current FET Drivers
- Motor Speed and Direction Control

Pin Configurations

IS7-1845ASRH, IS7-1845ASEH
(8 LD CDIP2-T8 SBDIP)
TOP VIEW



IS9-1845ASRH, IS9-1845ASEH
(18 LD FLATPACK)
TOP VIEW



NOTES:

1. Grounding the COMP pin does not inhibit the output. The output may be inhibited by applying >1.2V to the ISENSE pin.
2. This part is production tested with C_t = 3.3nF and R_t = 10k timing components only.

Ordering Information

SMD ORDERING NUMBER (Note 3)	PART NUMBER (Note 4)	RADIATION HARDNESS (Total Ionizing Dose)	PACKAGE DESCRIPTION (RoHS Compliant)	PKG. DWG. #	TEMP. RANGE
5962F0150901V9A	IS0-1845ASRH-Q (Note 5)	HDR to 300krad(Si)	Die	N/A	-50 to +125 °C
5962F0150902V9A	IS0-1845ASEH-Q (Note 5)	HDR to 300krad(Si), LDR to 50krad(Si)			
N/A	IS0-1845ASRH/SAMPLE (Notes 5, 6)	N/A			
5962F0150901VPC	IS7-1845ASRH-Q	HDR to 300krad(Si)	8 Ld SBDIP	D8.3	
5962F0150901QPC	IS7-1845ASRH-8				
5962F0150902VPC	IS7-1845ASEH-Q	HDR to 300krad(Si), LDR to 50krad(Si)			
N/A	IS7-1845ASRH/PROTO (Note 6)	N/A			
5962F0150901VXC	IS9-1845ASRH-Q	HDR to 300krad(Si)	18 Ld Flatpack	K18.B	
5962F0150901QXC	IS9-1845ASRH-8				
5962F0150902VXC	IS9-1845ASEH-Q	HDR to 300krad(Si), LDR to 50krad(Si)			
N/A	IS9-1845ASRH/PROTO (Note 6)	N/A			

NOTES:

- Specifications for Rad Hard QML devices are controlled by the Defense Logistics Agency Land and Maritime (DLA). The SMD numbers listed must be used when ordering.
- These Pb-free Hermetic packaged products employ 100% Au plate - e4 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations.
- Die product tested at $T_A = +25^\circ\text{C}$. The wafer probe test includes functional and parametric testing sufficient to make the die capable of meeting the electrical performance outlined in SMD.
- The /PROTO and /SAMPLE parts are not rated or certified for Total Ionizing Dose (TID) or Single Event Effect (SEE) immunity. These parts are intended for engineering evaluation purposes only. The /PROTO parts meet the electrical limits and conditions across temperature specified in the DLA SMD and are in the same form and fit as the qualified device. The /SAMPLE parts are capable of meeting the electrical limits and conditions specified in the DLA SMD. The /SAMPLE parts do not receive 100% screening across temperature to the DLA SMD electrical limits. These part types do not come with a Certificate of Conformance because they are not DLA qualified devices.

Typical Performance Curves

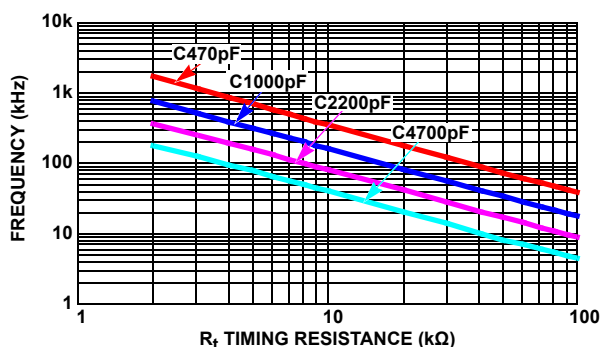


FIGURE 1. OSCILLATOR FREQUENCY vs R_t and C_t

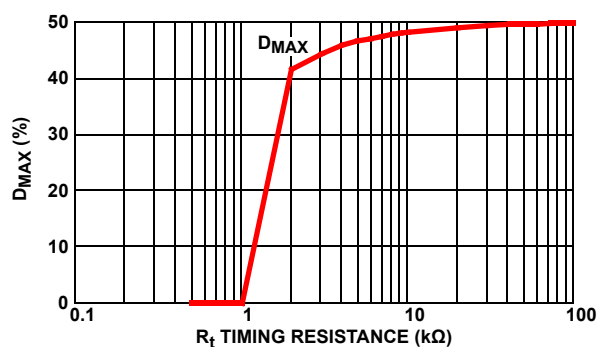


FIGURE 2. MAXIMUM DUTY CYCLE vs R_t

Die Characteristics

DIE DIMENSIONS

3090 μ m x 4080 μ m (121.6 mils x 159.0 mils)
 Thickness: 483 μ m $\pm$ 25.4 μ m (19 mils $\pm$ 1 mil)

INTERFACE MATERIALS

Glassivation

Type: Phosphorus Silicon Glass (PSG)
 Thickness: 8.0kÅ $\pm$ 1.0kÅ

Top Metallization

Type: AlSiCu
 Thickness: 16.0kÅ $\pm$ 2kÅ

Substrate

Radiation Hardened Silicon Gate,
 Dielectric Isolation

Backside Finish

Silicon

ASSEMBLY RELATED INFORMATION

Substrate Potential

Unbiased (DI)

ADDITIONAL INFORMATION

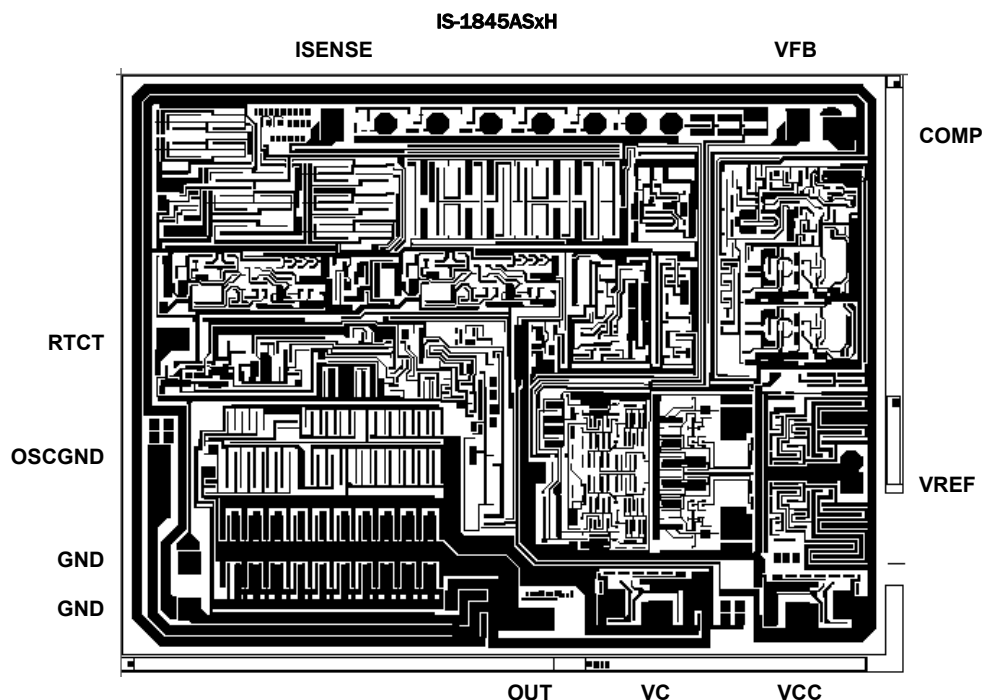
Worst Case Current Density

$<2.0 \times 10^5$ A/cm²

Transistor Count

582

Metallization Mask Layout



NOTES:

7. Both the GND pads must be bonded to ground.
8. The OUT double-sized bond pad must be double bonded for current sharing purposes.
9. The OSCGND double-sized bond pad must be double bonded to ground for current sharing purposes.

Revision History

The revision history provided is for informational purposes only and is believed to be accurate, but not warranted. Please visit our website to make sure you have the latest revision.

DATE	REVISION	CHANGE
Feb 16, 2022	7.01	Updated page 1 description. Updated Radiation Environment feature bullets. Updated Note 2. Updated ordering information table by adding Note 5, updating Note 6, adding Radiation Hardness information, and reformatting. Updated Figure 2.
Nov 1, 2019	7.00	Added Related Literature Updated Links throughout. Updated Ordering information by updating temperature for die parts and adding applicable notes. Added Revision History. Updated Disclaimer.

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(Rev.1.0 Mar 2020)

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