HiRel Product Development for Satellite Applications

Customers partner with SSDI to alleviate concerns with reliability issues

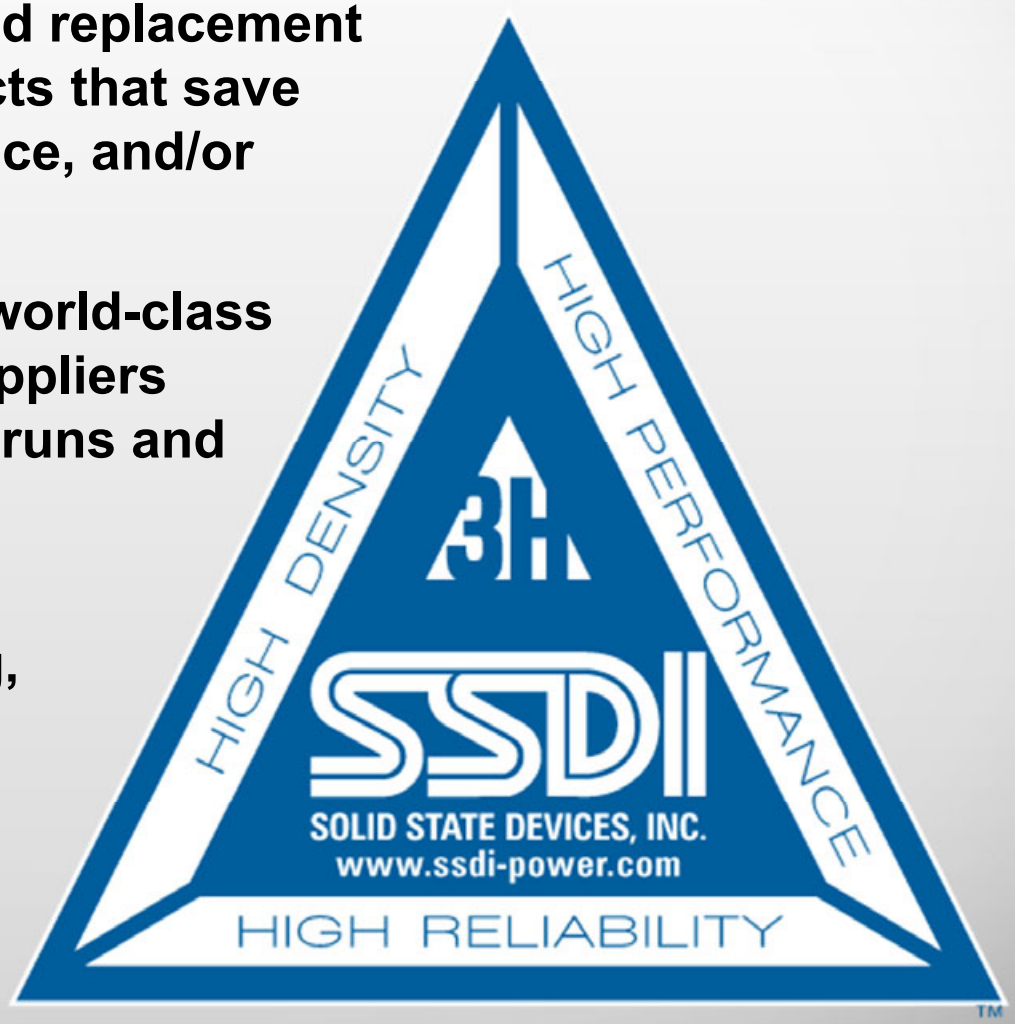
Solid State Devices, Inc.

JANS Certified and ISO 9001 / AS9100 Registered

www.ssdi-power.com | (562) 404-4474

SSDI “3H” Products

- When customers experience real world issues, SSDI is able to build replacement products or unique products that save space, enhance performance, and/or resolve reliability issues
- Strong relationships with world-class die foundries and parts suppliers facilitate small production runs and reasonable lead times
- Builds unique products: SCDs, reverse engineering, product development, and special packaging



Customer Inquiry: Solar Array Bypass Diode

- **3 A, 400 V solar array bypass diode i.a.w. customer's drawing**
- **Two SMD.5 or SMD1 diodes with ribbon leads in series for redundancy**

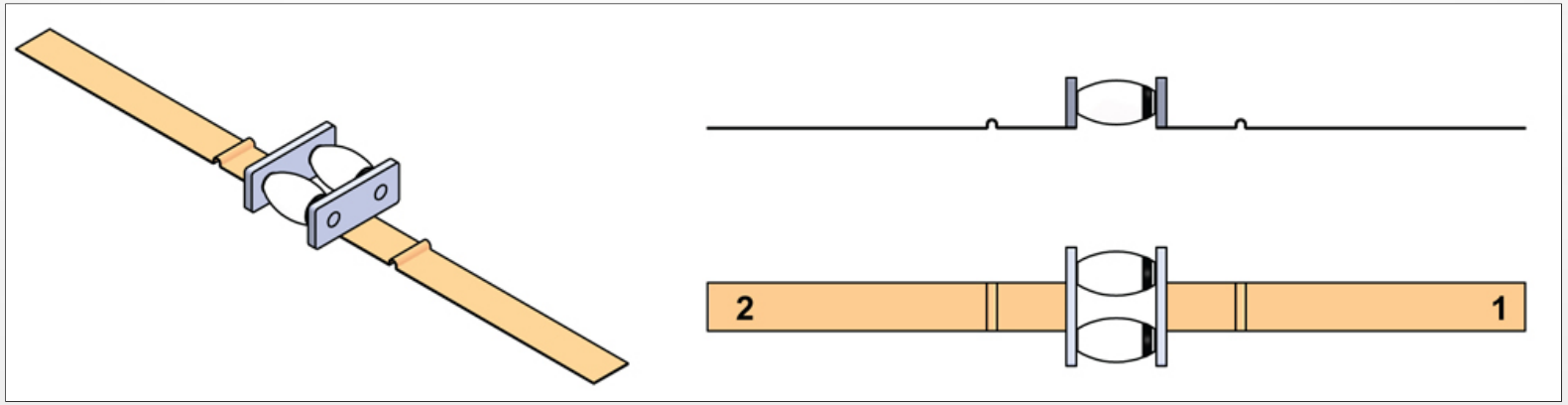
- **SSDI initially offered standard SMD devices with ribbon leads**

Solution 1

Solution 2

- **SSDI developed leaded SMD packages in the 1990's to offer the following advantages:**
  - Ribbon leads reduce risk of vibration stress and thermal fatigue
  - Customizable lead dimensions available
  - Facilitates lead inspection

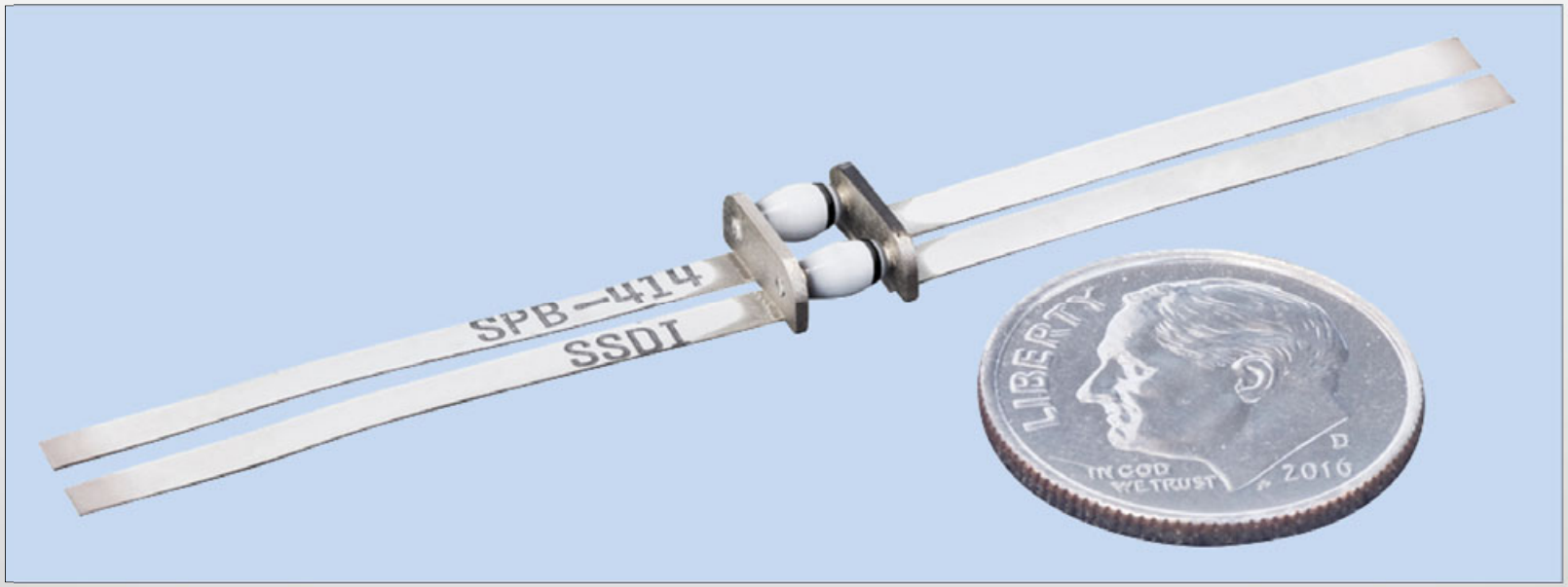
SSDI's Recommended Design



- Replace two separate diodes with two diodes in series and in parallel
- Utilize SSDI's S-level void free diodes in place of SMD cavity packages
- With void free diodes, PIND testing is no longer necessary and hermeticity concerns are mitigated
- All high-temperature construction for ultimate reliability (>600°C)
- Silver plated flat leads with Nickel underplate to facilitate welding to BUS bar

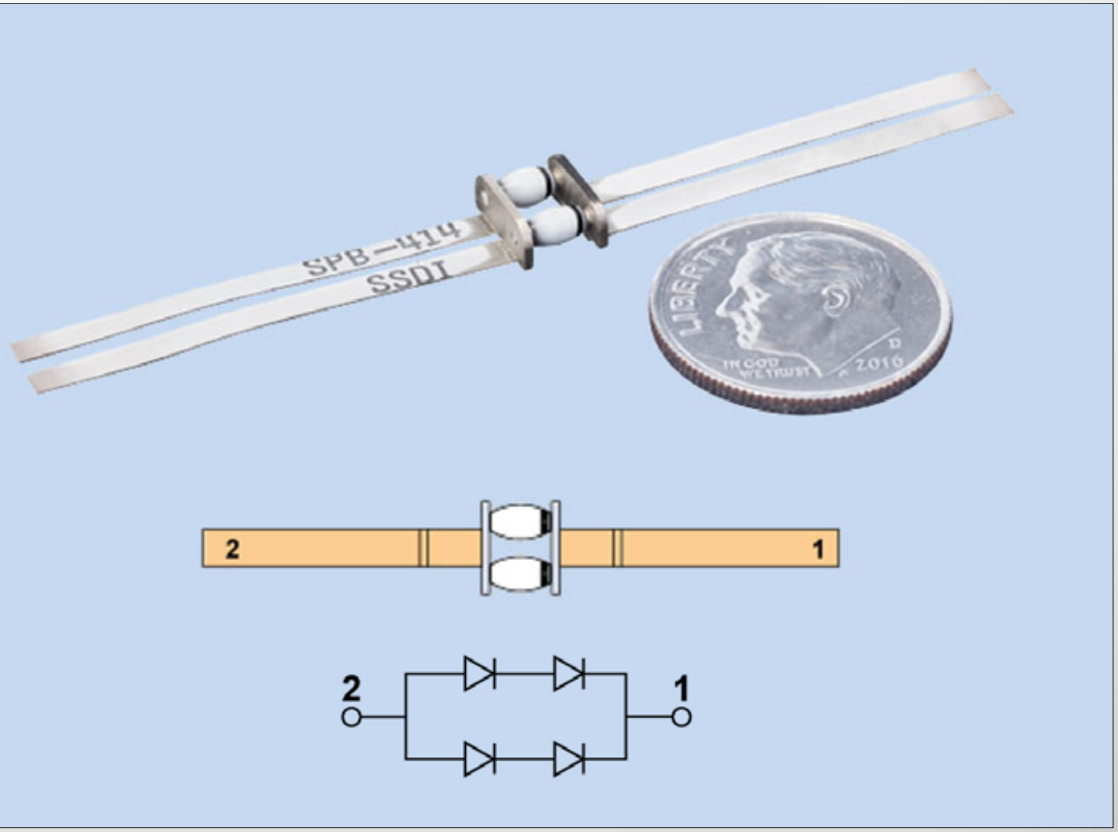
SSDI's Revised Design with Customer's Requested Modifications

- Round the upper corners of the diode mounting plates
- Separate the ribbon leads for redundancy purposes



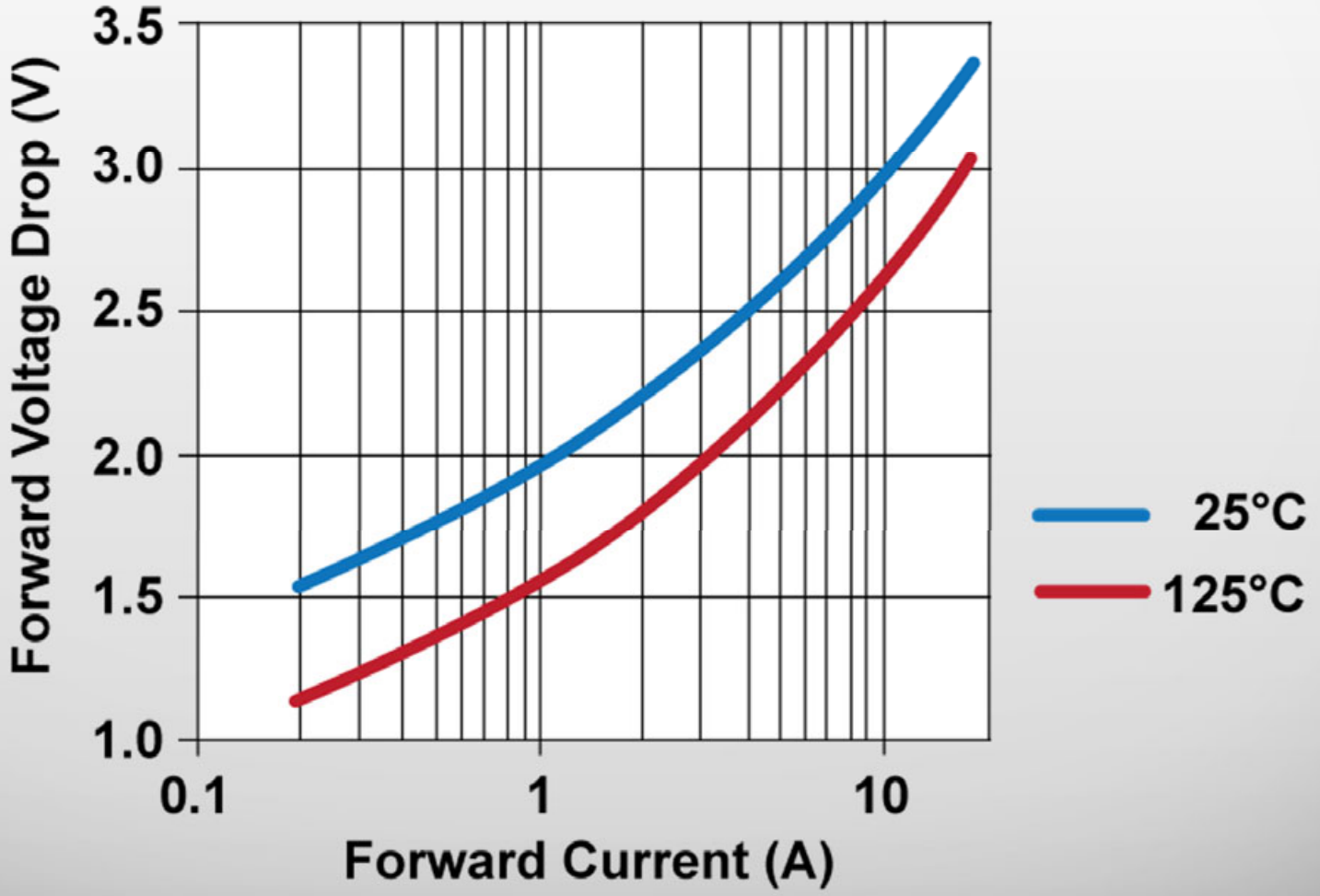
SSDI Supplied Engineering Samples for Customer Evaluation

Ratings		SPB414
I_O		6 A
V_R		800 V
V_F	@ 3 A	2.4 V typ
	@ 18 A	3.4 V typ
I_R	@ 25°C	0.2 µA typ
	@ 125°C	5 µA typ
C_J		20 pF typ
t_{RR}		250 ns



SPB-414

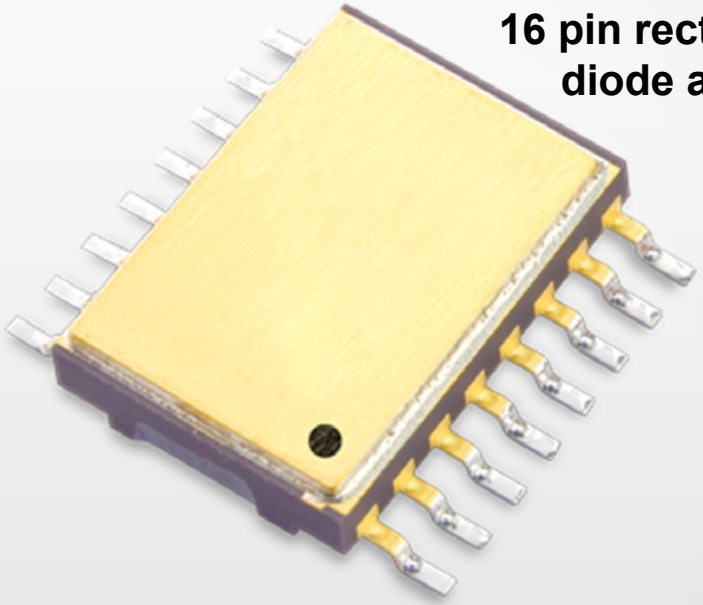
Typical V_F vs I_F vs T_C



Customer Inquiries: Diode Array

Customer 1

- **Drop-in replacement for 16 pin rectifier diode array for a signal switch module in a satellite**
- **1 A, 300 V diode array utilizing two rectifier diodes for each leg for redundancy**



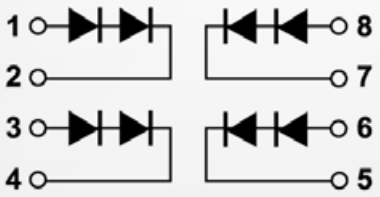
16 pin rectifier diode array

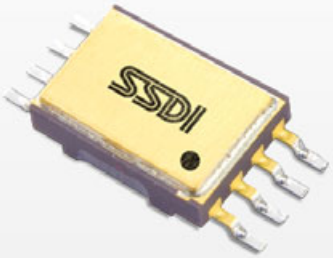
Customer 2

- **Diode array for command / telemetry systems in a satellite**
- **Reduce footprint to accommodate board space needs**
- **Relax electrical parameters by switching from a two die 400 V, 16 pin device to a one die 200 V, 8 pin device**

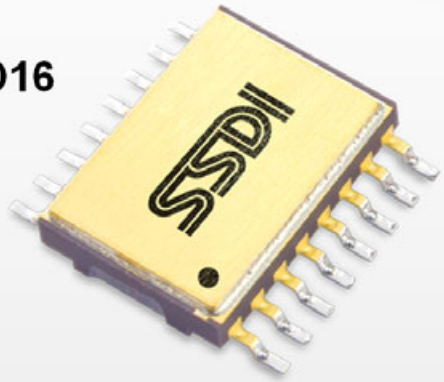
SSDI's Solution for Customer 1 (SD0140)

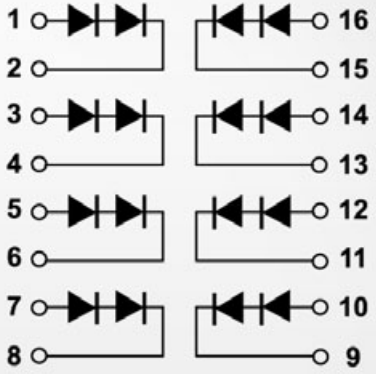
SO8





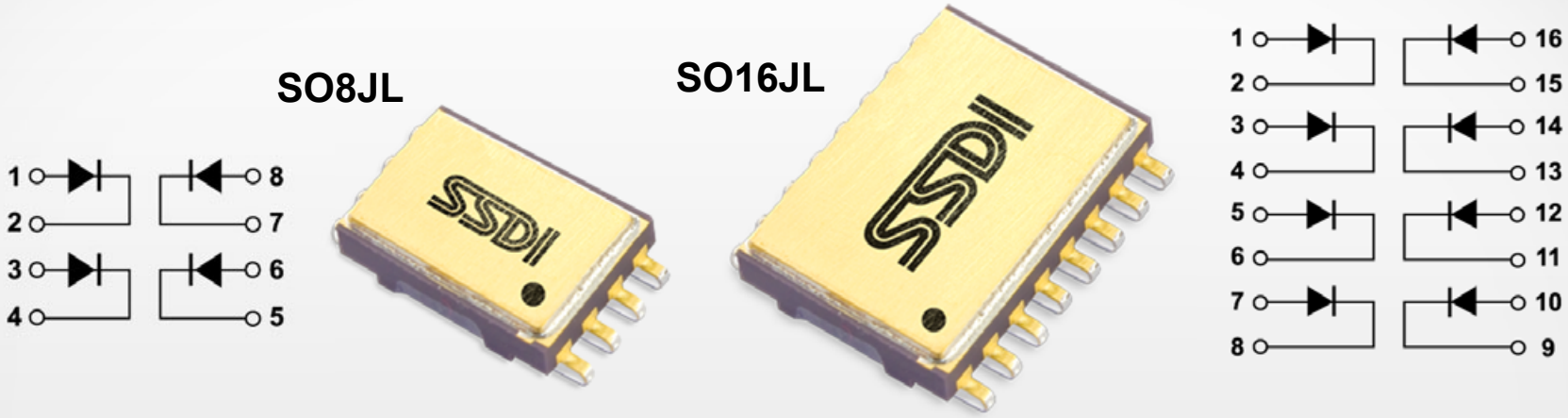
SO16





- Offered 1A, 400 V 16 pin drop-in replacement as well as an 8 pin version
- Utilized 200 V Schottky die instead of rectifier die
  - Better reverse recovery performance (35 ns vs. 45 ns)
  - Higher reverse voltage (400 V vs. 300 V)
- An array of 8 diodes – each leg has 2 diodes in series for redundancy
- High reliability hermetic ceramic packages
- SSDI can cross reference most of its competitors' products and often offer enhanced performance

SSDI's Solution for Customer 2 (SD0120)



- Offered 1A, 200 V 8 pin and 16 pin versions
- Offered J-Leads bend option for additional space savings
- Utilized 200 V Schottky die instead of rectifier die
  - Better reverse recovery performance (35 ns vs. 45 ns)
  - Relaxed reverse voltage per customer request (200 V vs. 300 V)
- High reliability hermetic ceramic packages
- SSDI can build products to meet or exceed the program's electrical and / or mechanical specifications

SD0120 & SD0140 Schottky Diode Arrays vs. Competitor's Rectifier Diode Array

Ratings		SD0120	SD0140	Competitor's Part
I_O		1 A		1 A
V_R		200 V	400 V	300 V
I_{FSM}		25 A	20 A	10 A
$R_{\Theta JC}$		13°C/W		13°C/W
V_F	@ 1 A, 25°C	2 V		2 V
I_R	@ 25°C	0.3 µA typ		-
	@ 100°C	25 µA typ		-
C_J	@ 5 V	10 pF typ		-
t_{RR}		35 ns		45 ns
Packages		SO8, SO8JL, SO16, SO16JL		16 pin SOIC

THANK YOU

For additional information, contact:
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