

**POWER DISCRETES**
**Description**

Quick reference data

$$V_R = 50 - 600V$$

$$I_F = 4.5A$$

$$t_{rr} = 150 - 400nS$$

$$I_R = 1.0\mu A$$

**Features**

- ◆ Very low reverse recovery time
- ◆ Hermetically sealed non-cavity construction.
- ◆ Low switching losses
- ◆ Low forward voltage drop
- ◆ Soft, non-snap off, recovery characteristics
- ◆ Capable of withstanding temperature cycle conditions from -180°C to +130°C for space critical programs.

These products are qualified to MIL-PRF-19500/411. They can be supplied fully released as JAN, JANTX, JANTXV and JANS versions.

**Absolute Maximum Ratings**

Electrical specifications @  $T_A = 25^\circ C$  unless otherwise specified.

|   | Symbol      | 1N5415<br>3SF05 | 1N5416<br>3SF1 | 1N5417<br>3SF2 | 1N5418<br>3SF4 | 1N5419<br>3SF5 | 1N5420<br>3SF6 | Units |
|---|-------------|-----------------|----------------|----------------|----------------|----------------|----------------|-------|
| Working Reverse Voltage   | $V_{RWM}$   | 50              | 100            | 200            | 400            | 500            | 600            | V     |
| Repetitive Reverse Voltage  | $V_{RRM}$   | 50              | 100            | 200            | 400            | 500            | 600            | V     |
| Average Forward Current<br>@ 55°C in free air, lead length<br>0.375"  | $I_{F(AV)}$ | 4.5             |                |                |                |                |                | A     |
| Repetitive Surge Current<br>@ 55°C in free air, lead length<br>0.375"                                       | $I_{FRM}$   | 25              |                |                |                |                |                | A     |
| Non-Repetitive Surge Current<br>( $t_p = 8.3mS$ @ $V_R$ & $T_{JMAX}$ )<br>( $t_p = 8.3mS$ , @ $V_R$ & 25°C) | $I_{FSM}$   | 80<br>150       |                |                |                |                |                | A     |
| Storage Temperature Range   | $T_{STG}$   | -65 to +175     |                |                |                |                |                | °C    |

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**Electrical Specifications**

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|---|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| Average Forward Current max.<br>for sine wave, $T_A = 55^\circ\text{C}$                                   | $I_{F(AV)}$    | 3.0             |                |                |                |                |                | A                |
| Average Forward Current max.<br>( $T_L = 55^\circ\text{C}$ ; $L = 3/8"$ )<br>for sine wave                | $I_{F(AV)}$    | 4.4             |                |                |                |                |                | A                |
| for square wave   | $I_{F(AV)}$    | 4.5             |                |                |                |                |                | A                |
| Pt for fusing ( $t = 8.3\text{mS}$ ) max  | Pt             | 90              |                |                |                |                |                | A <sup>2</sup> S |
| Forward Voltage Drop max.<br>@ $I_F = 3.0\text{A}$ , $T_j = 25^\circ\text{C}$                             | $V_F$          | 1.1             |                |                |                |                |                | V                |
| Reverse Current max.<br>@ $V_{RWM}$ , $T_j = 25^\circ\text{C}$<br>@ $V_{RWM}$ , $T_j = 100^\circ\text{C}$ | $I_R$<br>$I_R$ | 1.0<br>20       |                |                |                |                |                | $\mu\text{A}$    |
| Reverse Recovery Time max.<br>0.5A $I_F$ to 1.0A $I_{RM}$ recovers to 0.25A<br>$I_{RM(REC)}$              | trr            | 150             | 150            | 150            | 150            | 250            | 400            | nS               |
| Junction Capacitance typ.<br>@ $V_R = 4\text{V}$ , $f = 1\text{MHz}$                                      | Cj             | 550             | 430            | 250            | 165            | 140            | 120            | pF               |

**Thermal Characteristics**

|   | Symbol          | 1N5415<br>3SF05 | 1N5416<br>3SF1 | 1N5417<br>3SF2 | 1N5418<br>3SF4 | 1N5419<br>3SF5 | 1N5420<br>3SF6 | Units              |
|---|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|--------------------|
| Thermal Resistance-Junction to Lead<br>Lead length = 0.375"                   | $R_{\theta JL}$ | 20              |                |                |                |                |                | $^\circ\text{C/W}$ |
| Lead length = 0.0"  | $R_{\theta JL}$ | 4               |                |                |                |                |                | $^\circ\text{C/W}$ |
| Thermal Resistance-Junction to<br>Ambient on 0.06" thick pcb. 1 oz.<br>copper | $R_{\theta JA}$ | 75              |                |                |                |                |                | $^\circ\text{C/W}$ |

**Application Note**

These diodes are capable of withstanding 20 cycles of Temperature Cycling from  $-180^\circ\text{C}$  to  $+130^\circ\text{C}$  for for Space Critical Programs. Semtech is also able to offer this test condition as a 100% Screening Option. A full Summary Data Report is available on request. Please consult the factory for details.

POWER DISCRETES

Typical Characteristics

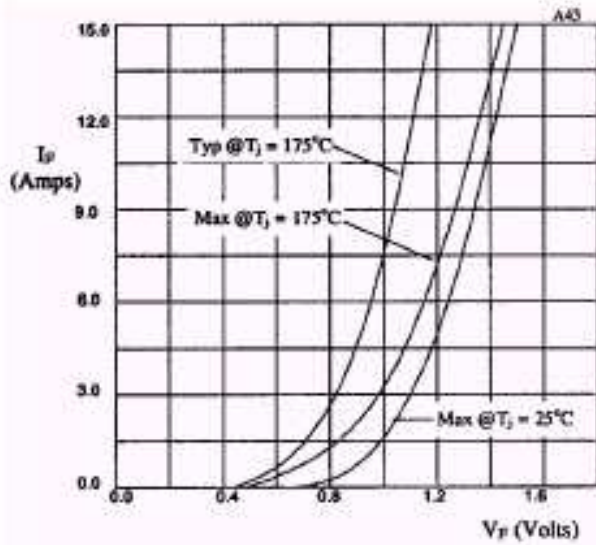


Fig 1. Forward voltage drop as a function of forward current.

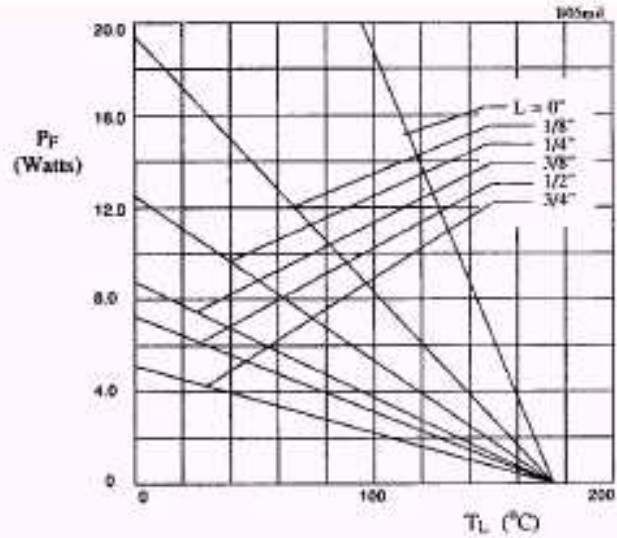


Fig 2. Maximum power versus lead temperature.

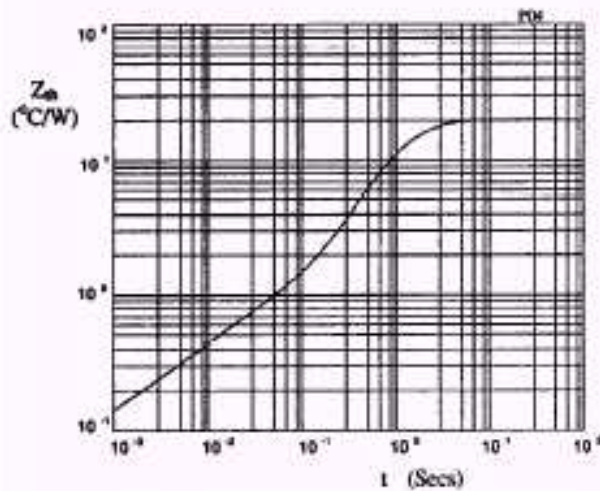


Fig 3. Transient thermal impedance characteristic.

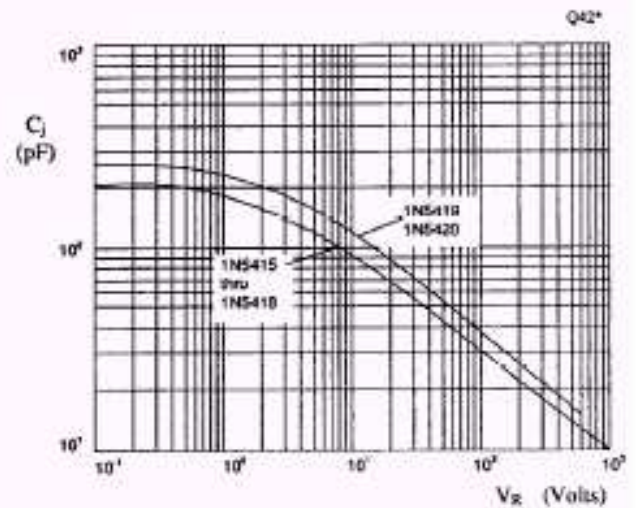


Fig 4. Typical junction capacitance as a function of reverse voltage.

**POWER DISCRETES**  
Typical Characteristics

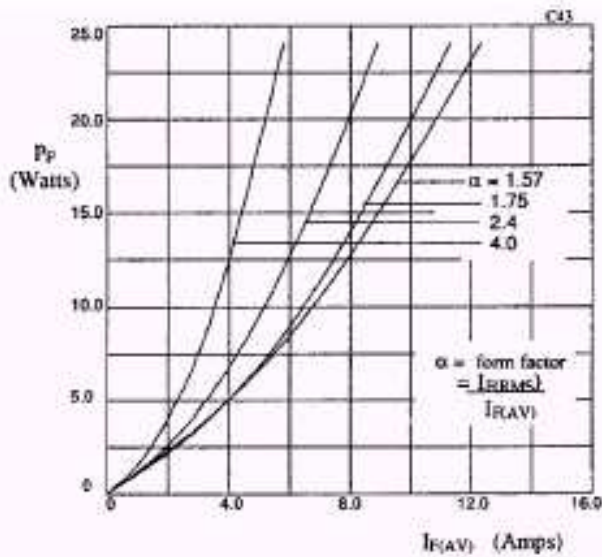


Fig 5. Forward power dissipation as a function of forward current, for sinusoidal operation.

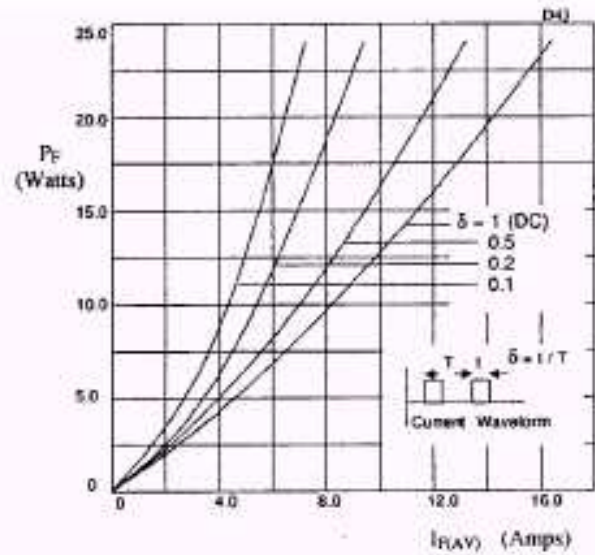


Fig 6. Forward power dissipation as a function of forward current, for square wave operation.

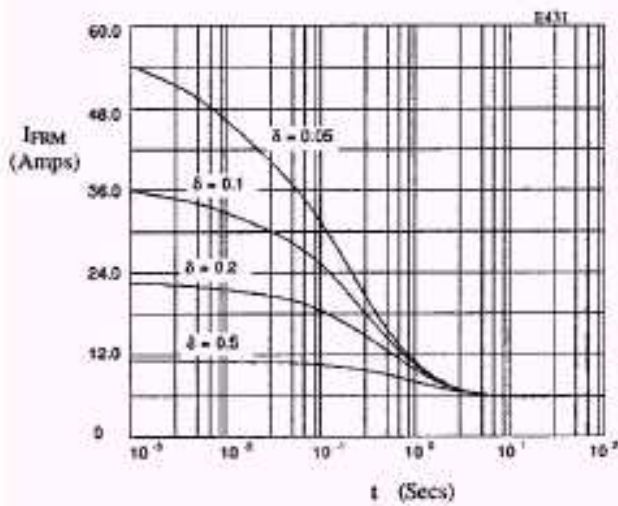


Fig 7. Typical repetitive forward current as a function of pulse width at 55°C;  $R_{\theta JL} = 20^\circ\text{C/W}$ ;  $V_{RWM}$  during  $1 - \delta$ .

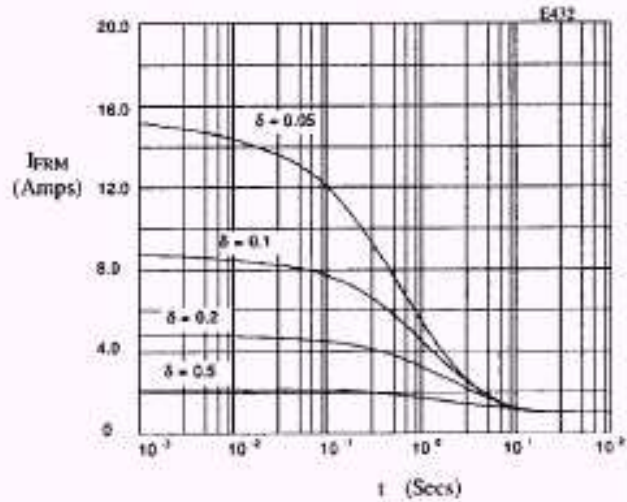


Fig 8. Typical repetitive forward current as a function of pulse width at 100°C;  $R_{\theta JL} = 80^\circ\text{C/W}$ ;  $V_{RWM}$  during  $1 - \delta$ .

**POWER DISCRETES**

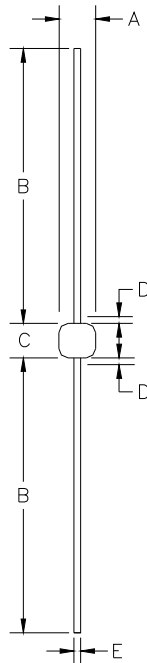
**Ordering Information**

| Part Number | Description                                     |
|-------------|---|
| 1N5415      | Axial leaded hermetically sealed <sup>(1)</sup> |
| 1N5416      |   |
| 1N5417      |   |
| 1N5418      |   |
| 1N5419      |   |
| 1N5420      |   |
| 3SF05       |   |
| 3SF1        |   |
| 3SF2        |   |
| 3SF4        |   |
| 3SF5        |   |
| 3SF6        |   |

Note:

(1) Available in bulk and tape and reel packaging. Please consult factory for quantities.

**Outline Drawing**



G4

| DIM <sup>N</sup> | Dimensions |       |             |      | Note |
|------------------|------------|-------|-------------|------|------|
|                  | Inches     |       | Millimeters |      |      |
|                  | MIN        | MAX   | MIN         | MAX  |      |
| A                | 0.135      | 0.18  | 3.43        | 4.57 | -    |
| B                | 0.9        | 1.3   | 22.9        | 33.0 | -    |
| C                | 0.13       | 0.17  | 3.3         | 4.32 | -    |
| D                | -          | 0.05  | -           | 1.27 | 1    |
| E                | 0.036      | 0.042 | 0.91        | 1.07 | -    |

Note:

(1) Lead diameter uncontrolled over this region.

Weight = 0.04oz

**Contact Information**

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