



# FOD815 Series

## 4-Pin High Operating Temperature Photodarlington Optocoupler

### Features

- Applicable to Pb-free IR reflow soldering
- Compact 4-pin package
- High current transfer ratio: 600% minimum
- C-UL, UL, and VDE approved
- High input-output isolation voltage of 5000Vrms
- Higher operating temperature (versus H11B815)

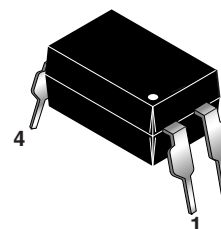
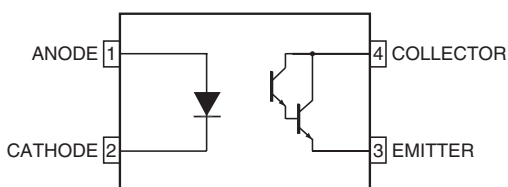
### Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

### Description

The FOD815 consists of a gallium arsenide infrared emitting diode, driving a silicon photodarlington output in a 4-pin dual in-line package.

### Functional Block Diagram



### Absolute Maximum Ratings (T<sub>A</sub> = 25°C Unless otherwise specified.)

| Symbol              | Parameter                   | Value          | Units |
|---------------------|-----------------------------|----------------|-------|
| <b>TOTAL DEVICE</b> |                             |                |       |
| T <sub>STG</sub>    | Storage Temperature         | -55 to +125    | °C    |
| T <sub>OPR</sub>    | Operating Temperature       | -30 to +105    | °C    |
| T <sub>SOL</sub>    | Lead Solder Temperature     | 260 for 10 sec | °C    |
| P <sub>TOT</sub>    | Total Power Dissipation     | 200            | mW    |
| <b>INPUT</b>        |                             |                |       |
| I <sub>F</sub>      | Forward Current             | 50             | mA    |
| P                   | Power Dissipation           | 70             | mW    |
| <b>OUTPUT</b>       |                             |                |       |
| V <sub>CEO</sub>    | Collector-Emitter Voltage   | 35             | V     |
| V <sub>ECO</sub>    | Emitter-Collector Voltage   | 6              | V     |
| I <sub>C</sub>      | Collector Current           | 80             | mA    |
| P <sub>C</sub>      | Collector Power Dissipation | 150            | mW    |

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)**Individual Component Characteristics**

| Symbol        | Parameter                           | Test Conditions                | Min. | Typ. | Max. | Unit          |
|---------------|-------------------------------------|--------------------------------|------|------|------|---------------|
| <b>INPUT</b>  |                                     |                                |      |      |      |               |
| $V_F$         | Forward Voltage                     | $I_F = 20\text{mA}$            | –    | 1.2  | 1.4  | V             |
| $C_t$         | Terminal Capacitance                | $V = 0, f = 1\text{kHz}$       | –    | 50   | 250  | pF            |
| <b>OUTPUT</b> |                                     |                                |      |      |      |               |
| $I_{CEO}$     | Collector Dark Current              | $V_{CE} = 10\text{V}, I_F = 0$ | –    | –    | 1    | $\mu\text{A}$ |
| $BV_{CEO}$    | Collector-Emitter Breakdown Voltage | $I_C = 0.1\text{mA}, I_F = 0$  | 35   | –    | –    | V             |
| $BV_{ECO}$    | Emitter-Collector Breakdown Voltage | $I_E = 10\mu\text{A}, I_F = 0$ | 6    | –    | –    | V             |

**Transfer Characteristics** ( $T_A = 25^\circ\text{C}$  Unless otherwise specified.)

| Symbol        | DC Characteristic                     | Test Conditions                                                      | Min. | Typ. | Max.  | Unit          |
|---------------|---------------------------------------|----------------------------------------------------------------------|------|------|-------|---------------|
| $I_C$         | Collector Current                     | $I_F = 1\text{mA}, V_{CE} = 2\text{V}$                               | 6    | –    | 75    | mA            |
| CTR           | Current Transfer Ratio <sup>(1)</sup> |                                                                      | 600  | –    | 7,500 | %             |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage  | $I_F = 20\text{mA}, I_C = 5\text{mA}$                                | –    | 0.8  | 1     | V             |
| $f_C$         | Cut-Off Frequency                     | $V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$ | 1    | 6    | –     | KHz           |
| $t_r$         | Response Time (Rise)                  | $V_{CE} = 2\text{V}, I_C = 10\text{mA}, R_L = 100\Omega$             | –    | 60   | 300   | $\mu\text{s}$ |
| $t_f$         | Response Time (Fall)                  |                                                                      | –    | 53   | 250   | $\mu\text{s}$ |

**Isolation Characteristics**

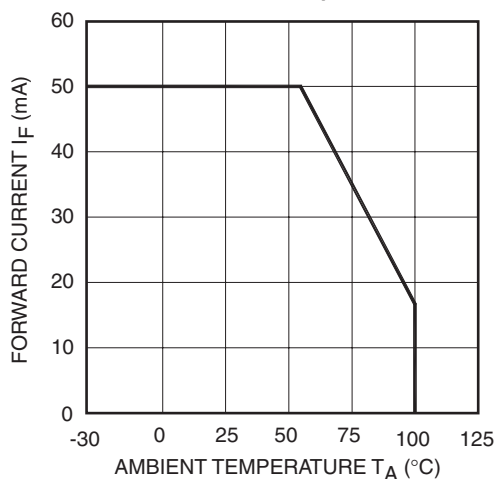
| Symbol    | Characteristic                 | Test Conditions                                                | Min.               | Typ.               | Max. | Units    |
|-----------|--------------------------------|----------------------------------------------------------------|--------------------|--------------------|------|----------|
| $V_{ISO}$ | Input-Output Isolation Voltage | $f = 60\text{Hz}, t = 1\text{ min}, I_{I-O} \leq 2\mu\text{A}$ | 5000               | –                  | –    | Vac(rms) |
| $R_{iso}$ | Isolation Resistance           | DC500V 40~60% R.H.                                             | $5 \times 10^{10}$ | $1 \times 10^{11}$ | –    | $\Omega$ |
| $C_f$     | Floating Capacitance           | $V = 0, f = 1\text{MHz}$                                       | –                  | 0.6                | 1    | pF       |

**Note:**

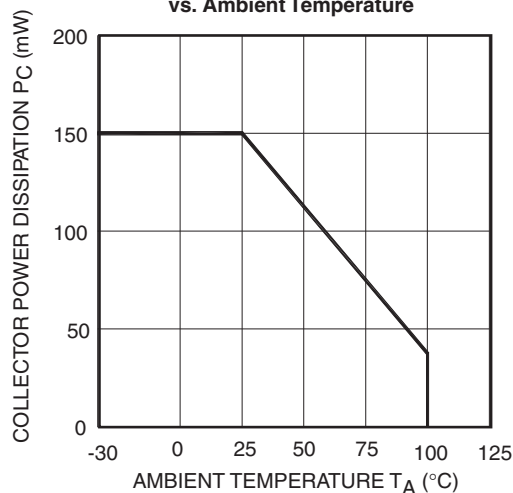
- Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

## Typical Electrical/Optical Characteristic Curves ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)

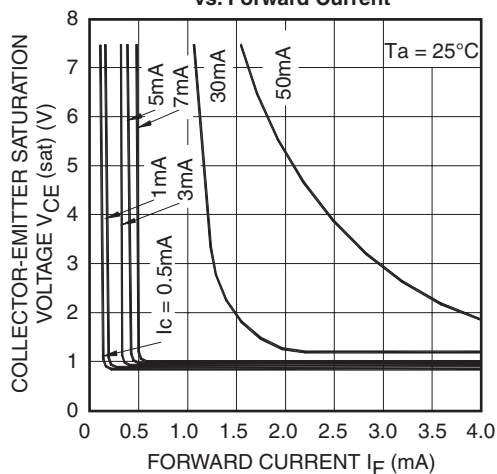
**Fig. 1 Forward Current vs. Ambient Temperature**



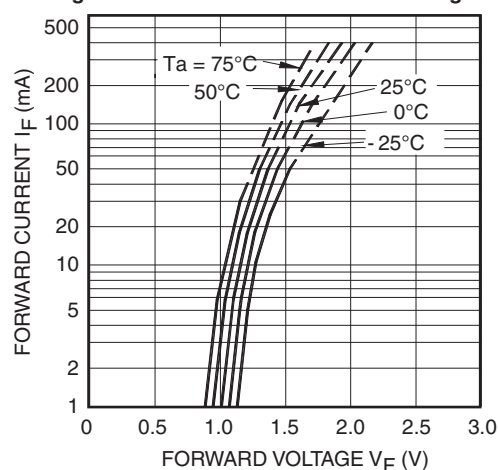
**Fig. 2 Collector Power Dissipation vs. Ambient Temperature**



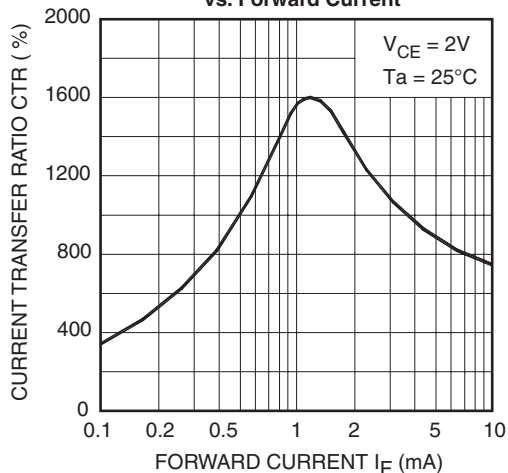
**Fig. 3 Collector-Emitter Saturation Voltage vs. Forward Current**



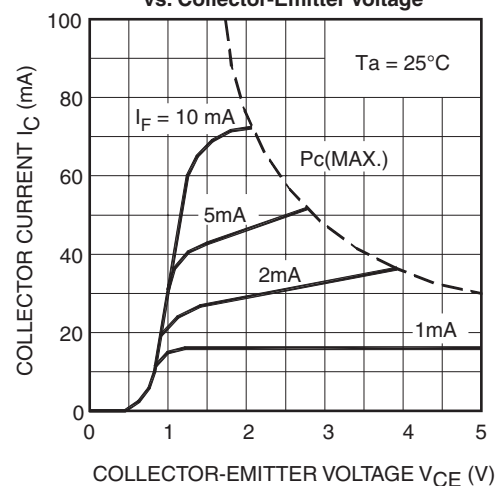
**Fig. 4 Forward Current vs. Forward Voltage**



**Fig. 5 Current Transfer Ratio vs. Forward Current**

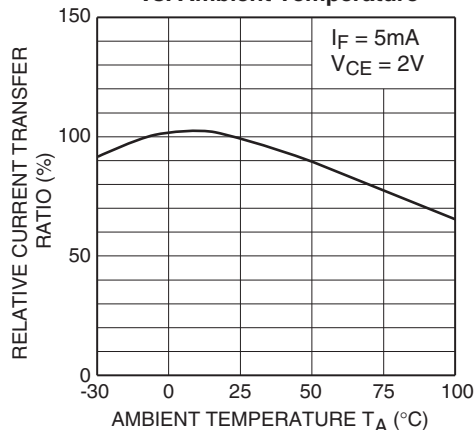


**Fig. 6 Collector Current vs. Collector-Emitter Voltage**

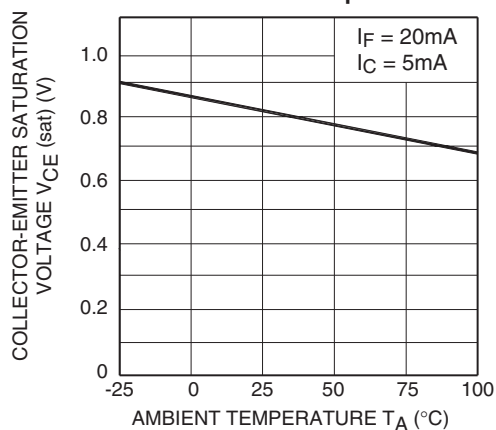


# Typical Electrical/Optical Characteristic Curves ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)

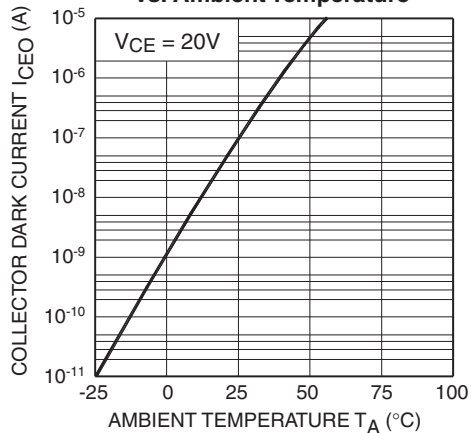
**Fig. 7. Relative Current Transfer Ratio vs. Ambient Temperature**



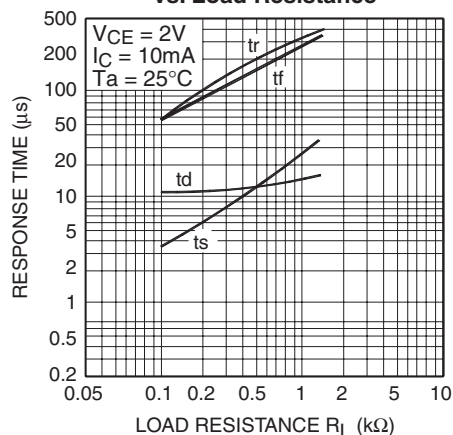
**Fig. 8 Collector-Emitter Saturation Voltage vs. Ambient Temperature**



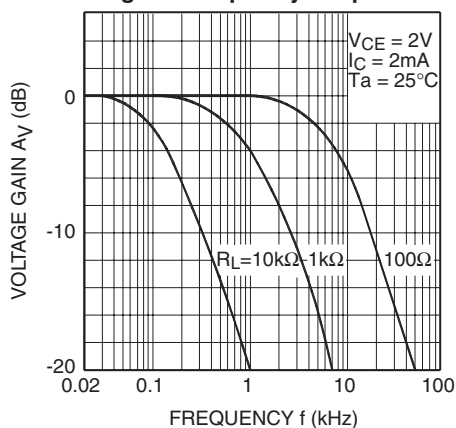
**Fig. 9 Collector Dark Current vs. Ambient Temperature**



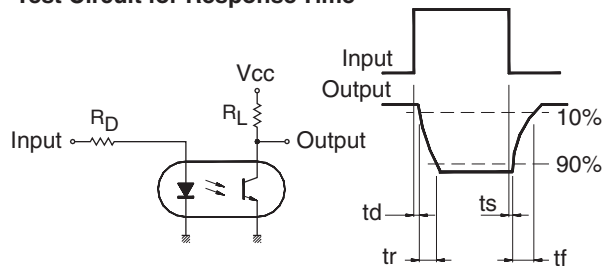
**Fig. 10. Response Time vs. Load Resistance**



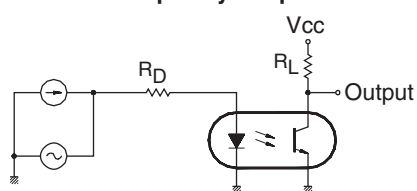
**Fig. 11. Frequency Response**



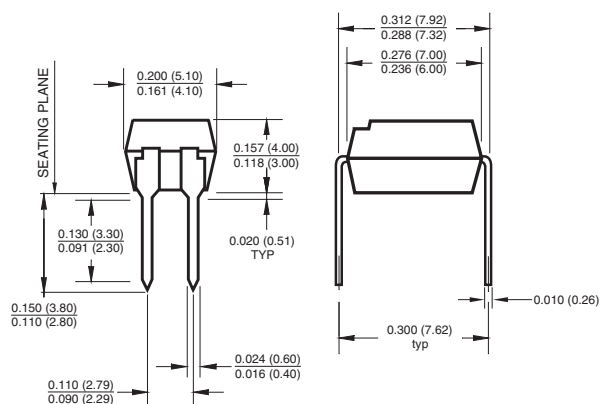
**Test Circuit for Response Time**



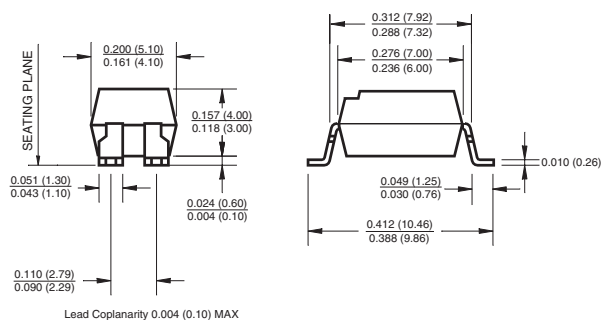
**Test Circuit for Frequency Response**



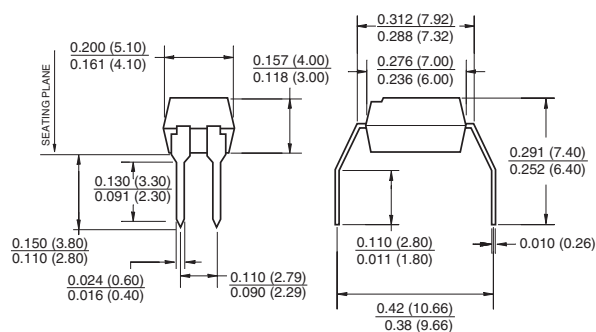
### Package Dimensions (Through Hole)



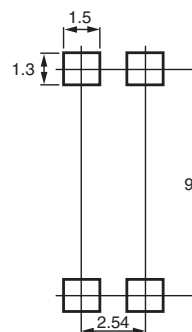
### Package Dimensions (Surface Mount)



### Package Dimensions (0.4" Lead Spacing)



### Footprint Dimensions (Surface Mount)



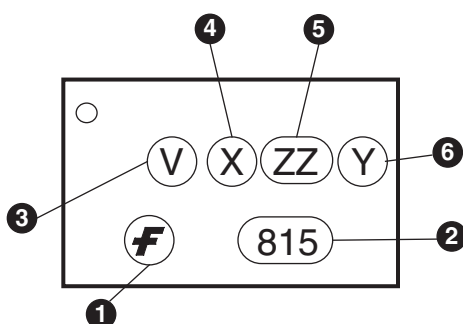
#### Note:

All dimensions are in inches (millimeters)

## Ordering Information

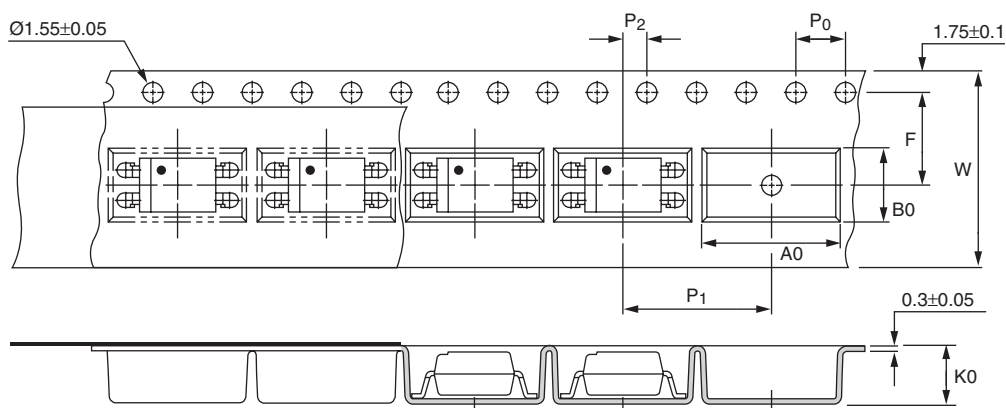
| Option | Order Entry Identifier | Description                              |
|--------|------------------------|------------------------------------------|
| S      | .S                     | Surface Mount Lead Bend                  |
| SD     | .SD                    | Surface Mount; Tape and reel             |
| W      | .W                     | 0.4" Lead Spacing                        |
| 300    | .300                   | VDE Approved                             |
| 300W   | .300W                  | VDE Approved, 0.4" Lead Spacing          |
| 3S     | .3S                    | VDE Approved, Surface Mount              |
| 3SD    | .3SD                   | VDE Approved, Surface Mount, Tape & Reel |

## Marking Information



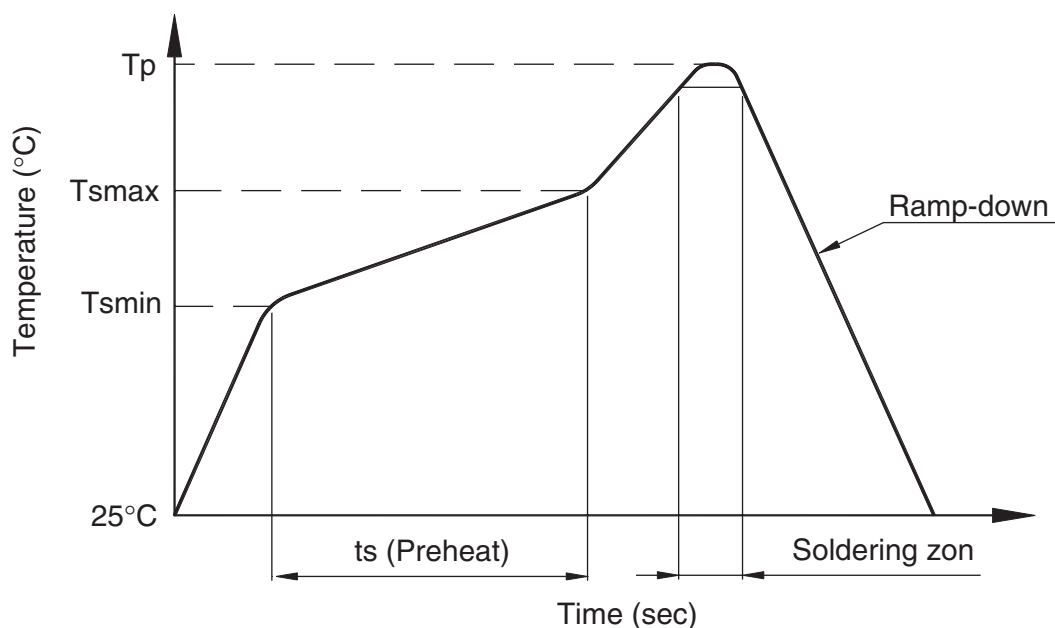
| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 2           | Device number                                                                          |
| 3           | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4           | One digit year code                                                                    |
| 5           | Two digit work week ranging from '01' to '53'                                          |
| 6           | Assembly package code                                                                  |

## Carrier Tape Specifications


**Note:**

All dimensions are in millimeters.

| Description                            | Symbol         | Dimensions in mm (inches) |
|----------------------------------------|----------------|---------------------------|
| Tape wide                              | W              | 16 ± 0.3 (.63)            |
| Pitch of sprocket holes                | P <sub>0</sub> | 4 ± 0.1 (.15)             |
| Distance of compartment                | F              | 7.5 ± 0.1 (.295)          |
|                                        | P <sub>2</sub> | 2 ± 0.1 (.079)            |
| Distance of compartment to compartment | P <sub>1</sub> | 12 ± 0.1 (.472)           |
| Compartment                            | A0             | 10.45 ± 0.1 (.411)        |
|                                        | B0             | 5.30 ± 0.1 (.209)         |
|                                        | K0             | 4.25 ± 0.1 (.167)         |

**Lead Free Recommended IR Reflow Condition**

| Profile Feature                           | Pb-Sn solder assembly         | Lead Free assembly            |
|-------------------------------------------|-------------------------------|-------------------------------|
| Preheat condition<br>(Tsmmin-Tsmmax / ts) | 100°C ~ 150°C<br>60 ~ 120 sec | 150°C ~ 200°C<br>60 ~ 120 sec |
| Melt soldering zone                       | 183°C<br>60 ~ 120 sec         | 217°C<br>30 ~ 90 sec          |
| Peak temperature (Tp)                     | 240 +0/-5°C                   | 260 +0/-5°C                   |
| Ramp-down rate                            | 6°C/sec max.                  | 6°C/sec max.                  |

**Recommended Wave Soldering condition**

| Profile Feature       | For all solder assembly |
|-----------------------|-------------------------|
| Peak temperature (Tp) | Max 260°C for 10 sec    |

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| ActiveArray™                         | FASTr™              | LittleFET™    | PowerSaver™         | SuperSOT™-3     |
| Bottomless™                          | FPS™                | MICROCOUPLER™ | PowerTrench®        | SuperSOT™-6     |
| Build it Now™                        | FRFET™              | MicroFET™     | QFET®               | SuperSOT™-8     |
| CoolFET™                             | GlobalOptoisolator™ | MicroPak™     | QS™                 | SyncFET™        |
| CROSSVOLT™                           | GTO™                | MICROWIRE™    | QT Optoelectronics™ | TCM™            |
| DOVE™                                | HiSeC™              | MSX™          | Quiet Series™       | TinyLogic®      |
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| E <sup>2</sup> C MOS™                | i-Lo™               | OCX™          | RapidConnect™       | TruTranslation™ |
| EnSigna™                             | ImpliedDisconnect™  | OCXPro™       | μSerDes™            | UHC™            |
| FACT™                                | IntelliMAX™         | OPTOLOGIC®    | ScalarPump™         | UniFET™         |
| FACT Quiet Series™                   |                     | OPTOPLANAR™   | SILENT SWITCHER®    | UltraFET®       |
| Across the board. Around the world.™ |                     | PACMAN™       | SMART START™        | VCX™            |
| The Power Franchise®                 |                     | POP™          | SPM™                | Wire™           |
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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

| Datasheet Identification | Product Status         | Definition                                                                                                                                                                                                            |
|--------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advance Information      | Formative or In Design | This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.                                                                                    |
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