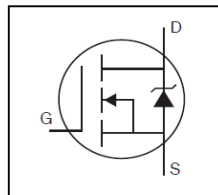


**Features**

- Optimized for Logic Level Drive
- Advanced Process Technology
- Ultra Low On-Resistance
- Logic Level Gate Drive
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to  $T_{jmax}$
- Lead-Free, RoHS Compliant
- Automotive Qualified \*



HEXFET® Power MOSFET

|                          |              |
|--------------------------|--------------|
| $V_{DS}$                 | <b>100V</b>  |
| $R_{DS(on)}$ <b>typ.</b> | <b>3.2mΩ</b> |
| <b>max.</b>              | <b>3.9mΩ</b> |
| $I_D$                    | <b>190A</b>  |



|      |       |        |
|------|-------|--------|
| G    | D     | S      |
| Gate | Drain | Source |

**Description**

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.

| Base Part Number | Package Type | Standard Pack      |          | Orderable Part Number |
|------------------|--------------|--------------------|----------|-----------------------|
|                  |              | Form               | Quantity |                       |
| AUIRLS4030-7P    | D²Pak 7 Pin  | Tube               | 50       | AUIRLS4030-7P         |
|                  |              | Tape and Reel Left | 800      | AUIRLS4030-7TRL       |

**Absolute Maximum Ratings**

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature ( $T_A$ ) is 25°C, unless otherwise specified.

| Symbol                          | Parameter                                               | Max.                    | Units |
|---------------------------------|---------------------------------------------------------|-------------------------|-------|
| $I_D @ T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10\text{V}$         | 190                     | A     |
| $I_D @ T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}$         | 130                     |       |
| $I_{DM}$                        | Pulsed Drain Current ①                                  | 750                     |       |
| $P_D @ T_C = 25^\circ\text{C}$  | Maximum Power Dissipation                               | 370                     | W     |
|                                 | Linear Derating Factor                                  | 2.5                     | W/°C  |
| $V_{GS}$                        | Gate-to-Source Voltage                                  | $\pm 16$                | V     |
| $E_{AS}$                        | Single Pulse Avalanche Energy (Thermally Limited) ②     | 320                     | mJ    |
| $I_{AR}$                        | Avalanche Current ①                                     | See Fig.14,15, 22a, 22b | A     |
| $E_{AR}$                        | Repetitive Avalanche Energy ④                           |                         | mJ    |
| $dv/dt$                         | Peak Diode Recovery ③                                   | 13                      | V/ns  |
| $T_J$                           | Operating Junction and                                  | -55 to + 175            | °C    |
| $T_{STG}$                       | Storage Temperature Range                               |                         |       |
|                                 | Soldering Temperature, for 10 seconds (1.6mm from case) | 300                     |       |

**Thermal Resistance**

| Symbol          | Parameter             | Typ. | Max. | Units |
|-----------------|-----------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-Case ⑧ ⑨  | —    | 0.40 | °C/W  |
| $R_{\theta JA}$ | Junction-to-Ambient ⑦ | —    | 40   |       |

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

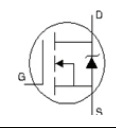
**Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

|                                 | Parameter                            | Min. | Typ. | Max. | Units               | Conditions                                            |
|---------------------------------|--------------------------------------|------|------|------|---------------------|-------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 100  | —    | —    | V                   | $V_{GS} = 0V, I_D = 250\mu A$                         |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.10 | —    | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = 5mA$ ①       |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | 3.2  | 3.9  | $m\Omega$           | $V_{GS} = 10V, I_D = 110A$ ④                          |
|                                 |                                      | —    | 3.3  | 4.1  |                     | $V_{GS} = 4.5V, I_D = 94A$ ④                          |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 1.0  | —    | 2.5  | V                   | $V_{DS} = V_{GS}, I_D = 250\mu A$                     |
| $g_{fs}$                        | Forward Trans conductance            | 250  | —    | —    | S                   | $V_{DS} = 25V, I_D = 110A$                            |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —    | 20   | $\mu A$             | $V_{DS} = 100V, V_{GS} = 0V$                          |
|                                 |                                      | —    | —    | 250  |                     | $V_{DS} = 100V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA                  | $V_{GS} = 16V$                                        |
|                                 | Gate-to-Source Reverse Leakage       | —    | —    | -100 |                     | $V_{GS} = -16V$                                       |
| $R_G$                           | Internal Gate Resistance             | —    | 2.0  | —    | $\Omega$            |                                                       |

**Dynamic Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

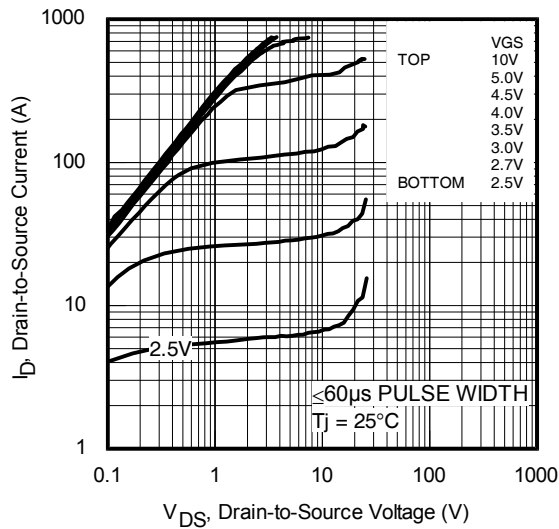
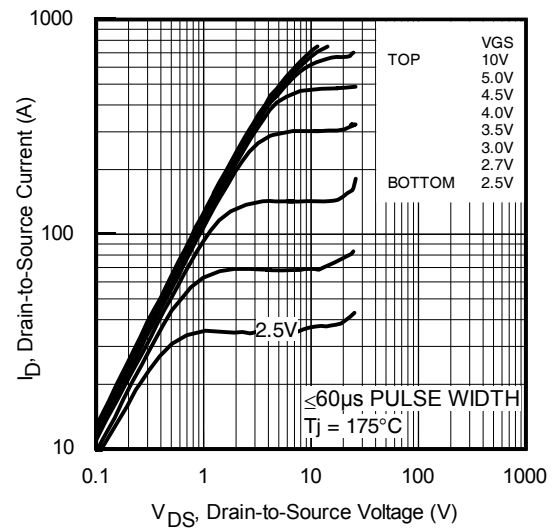
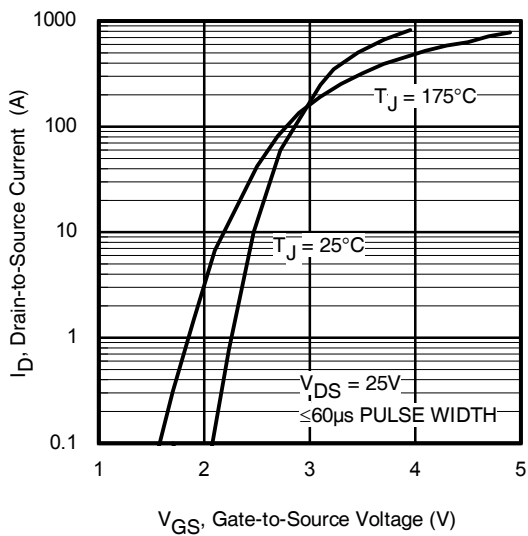
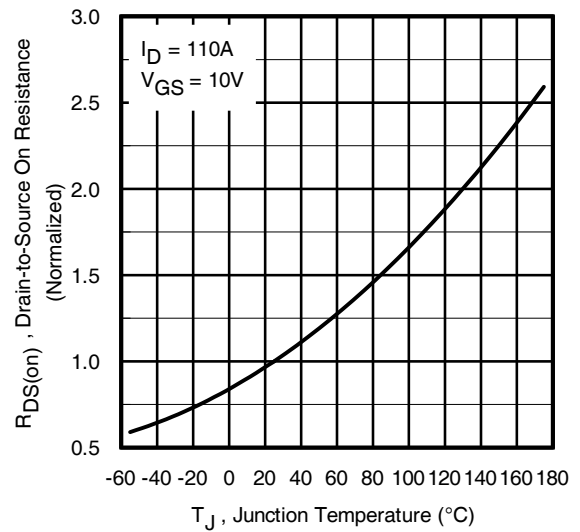
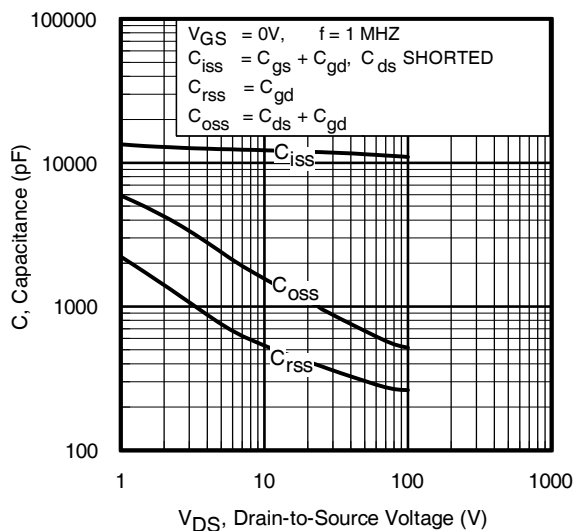
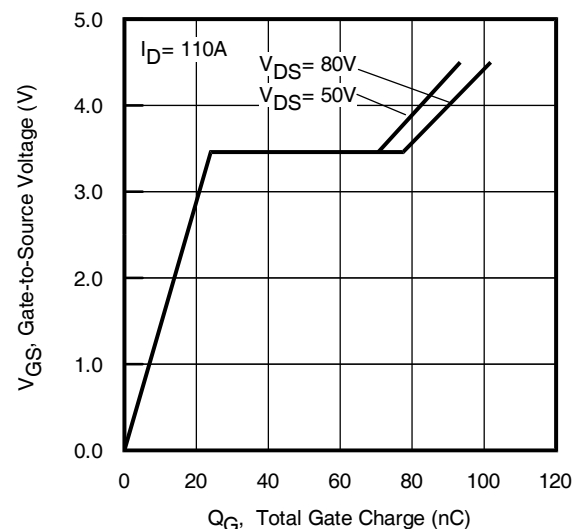
|                     |                                               |   |       |     |    |                                                                          |
|---------------------|-----------------------------------------------|---|-------|-----|----|--------------------------------------------------------------------------|
| $Q_g$               | Total Gate Charge                             | — | 93    | 140 | nC | $I_D = 110A$<br>$V_{DS} = 50V$<br>$V_{GS} = 4.5V$ ④                      |
| $Q_{gs}$            | Gate-to-Source Charge                         | — | 27    | —   |    |                                                                          |
| $Q_{gd}$            | Gate-to-Drain Charge                          | — | 43    | —   |    |                                                                          |
| $Q_{sync}$          | Total Gate Charge Sync. ( $Q_g - Q_{gd}$ )    | — | 50    | —   |    |                                                                          |
| $t_{d(on)}$         | Turn-On Delay Time                            | — | 53    | —   | ns | $V_{DD} = 65V$<br>$I_D = 110A$<br>$R_G = 2.7\Omega$<br>$V_{GS} = 4.5V$ ④ |
| $t_r$               | Rise Time                                     | — | 160   | —   |    |                                                                          |
| $t_{d(off)}$        | Turn-Off Delay Time                           | — | 110   | —   |    |                                                                          |
| $t_f$               | Fall Time                                     | — | 87    | —   |    |                                                                          |
| $C_{iss}$           | Input Capacitance                             | — | 11490 | —   | pF | $V_{GS} = 0V$                                                            |
| $C_{oss}$           | Output Capacitance                            | — | 680   | —   |    | $V_{DS} = 50V$                                                           |
| $C_{rss}$           | Reverse Transfer Capacitance                  | — | 300   | —   |    | $f = 1.0MHz$                                                             |
| $C_{oss\ eff.(ER)}$ | Effective Output Capacitance (Energy Related) | — | 760   | —   |    | $V_{GS} = 0V, V_{DS} = 0V$ to $80V$ ⑥                                    |
| $C_{oss\ eff.(TR)}$ | Effective Output Capacitance (Time Related)   | — | 1170  | —   |    | $V_{GS} = 0V, V_{DS} = 0V$ to $80V$ ⑤                                    |

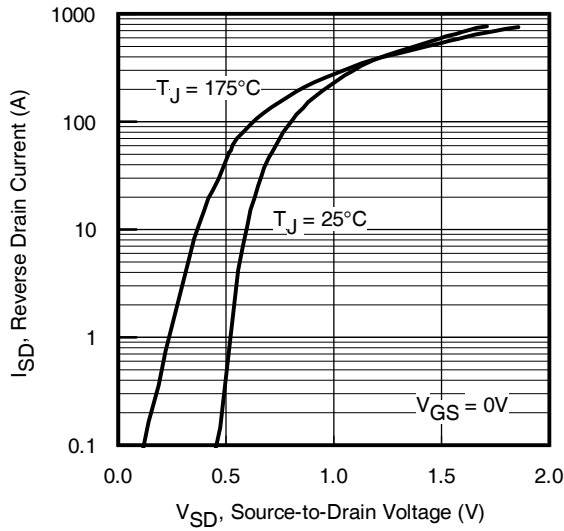
**Diode Characteristics**

|           | Parameter                              | Min.                                                                        | Typ. | Max. | Units | Conditions                                                                                                                                           |
|-----------|----------------------------------------|-----------------------------------------------------------------------------|------|------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$     | Continuous Source Current (Body Diode) | —                                                                           | —    | 190  | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$  | Pulsed Source Current (Body Diode) ①   | —                                                                           | —    | 750  |       |                                                                                                                                                      |
| $V_{SD}$  | Diode Forward Voltage                  | —                                                                           | —    | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 110A, V_{GS} = 0V$ ④                                                                                                  |
| $t_{rr}$  | Reverse Recovery Time                  | —                                                                           | 53   | —    | ns    | $T_J = 25^\circ\text{C}$ $V_{DD} = 85V$                                                                                                              |
|           |                                        | —                                                                           | 63   | —    |       | $T_J = 125^\circ\text{C}$ $I_F = 110A,$                                                                                                              |
| $Q_{rr}$  | Reverse Recovery Charge                | —                                                                           | 99   | —    | nC    | $T_J = 25^\circ\text{C}$ $di/dt = 100A/\mu s$ ④                                                                                                      |
|           |                                        | —                                                                           | 155  | —    |       | $T_J = 125^\circ\text{C}$                                                                                                                            |
| $I_{RRM}$ | Reverse Recovery Current               | —                                                                           | 3.3  | —    | A     | $T_J = 25^\circ\text{C}$                                                                                                                             |
| $t_{on}$  | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |       |                                                                                                                                                      |

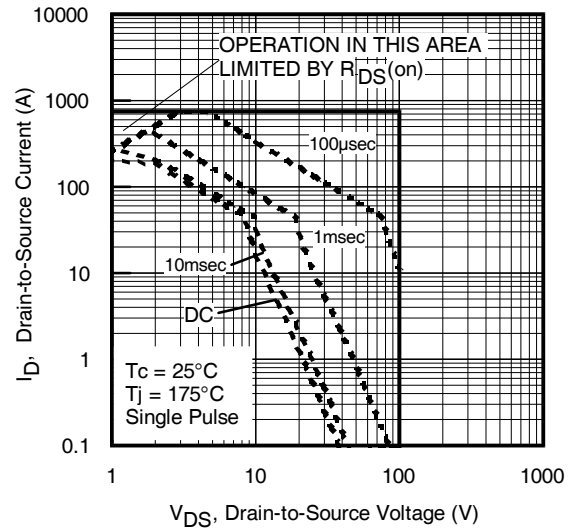
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{Jmax}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.05mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 110A$ ,  $V_{GS} = 10V$ . Part not recommended for use above this value.
- ③  $I_{SD} \leq 110A$ ,  $di/dt \leq 1520A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ⑤  $C_{oss\ eff. (TR)}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑥  $C_{oss\ eff. (ER)}$  is a fixed capacitance that gives the same energy as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑦ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994
- ⑧  $R_\theta$  is measured at  $T_J$  approximately  $90^\circ\text{C}$ .
- ⑨  $R_{\theta JC}$  value shown is at time zero.

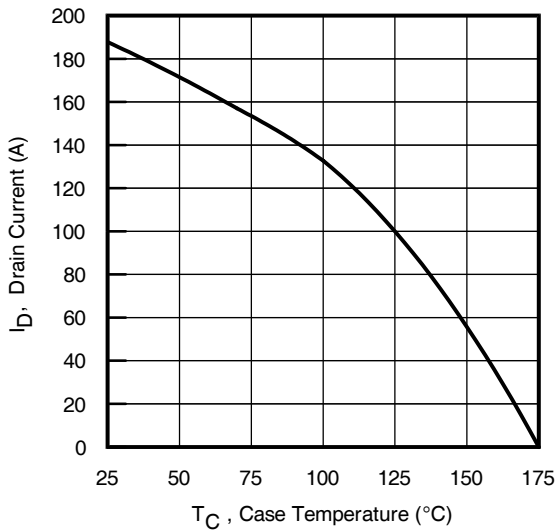

**Fig. 1** Typical Output Characteristics

**Fig. 2** Typical Output Characteristics

**Fig. 3** Typical Transfer Characteristics

**Fig. 4** Normalized On-Resistance vs. Temperature

**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



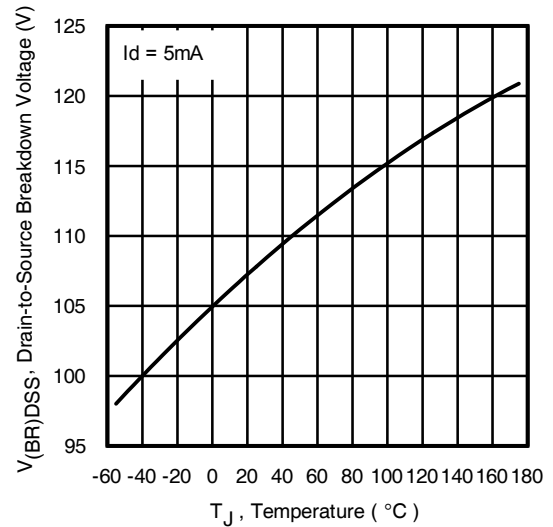
**Fig. 7** Typical Source-to-Drain Diode Forward Voltage



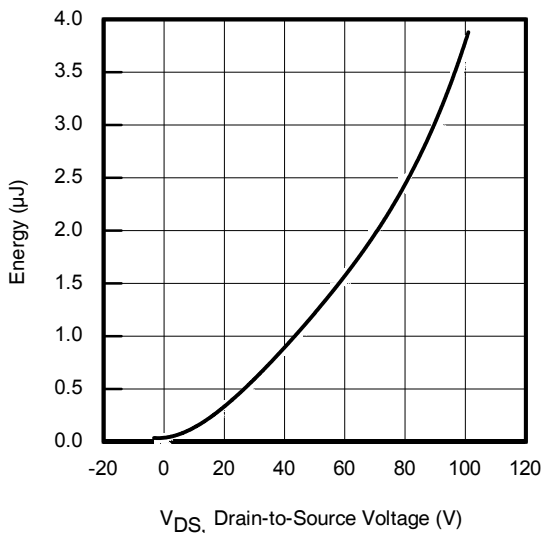
**Fig 8.** Maximum Safe Operating Area



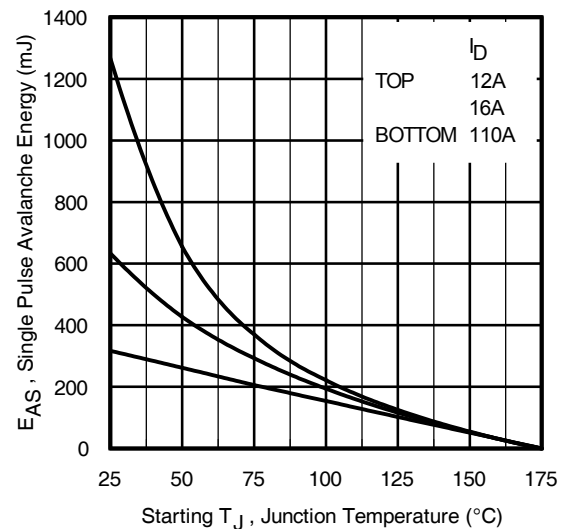
**Fig 9.** Maximum Drain Current vs. Case Temperature



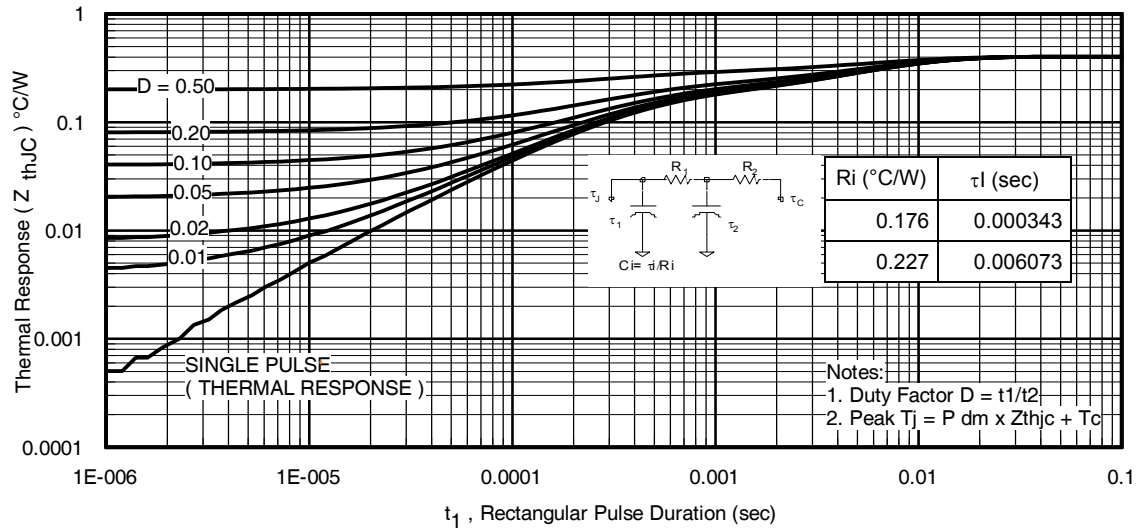
**Fig 10.** Drain-to-Source Breakdown Voltage



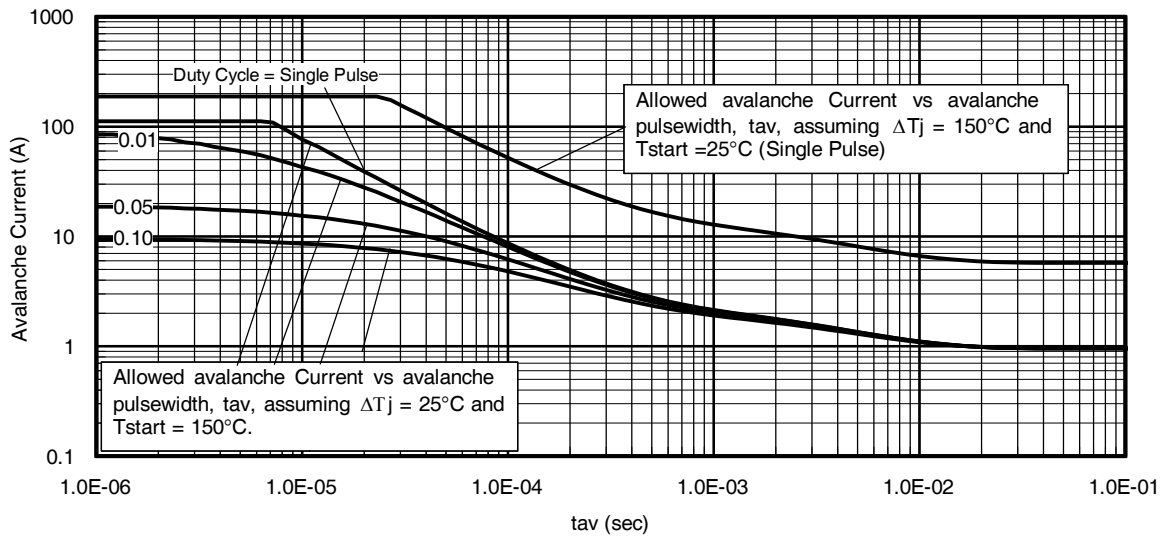
**Fig 11.** Typical Coss Stored Energy



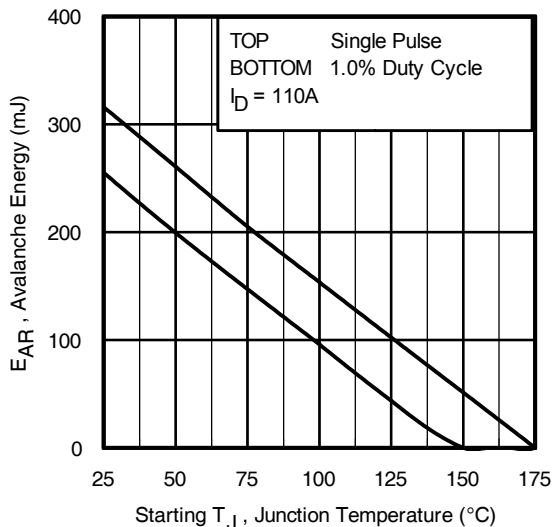
**Fig 12.** Maximum Avalanche Energy vs. Drain Current



**Fig 13.** Maximum Effective Transient Thermal Impedance, Junction-to-Case



**Fig 14.** Avalanche Current vs. Pulse width



**Notes on Repetitive Avalanche Curves , Figures 14, 15:**  
**(For further info, see AN-1005 at [www.infineon.com](http://www.infineon.com))**

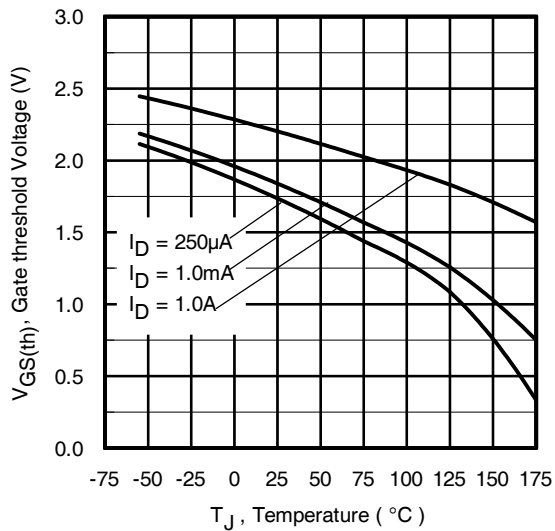
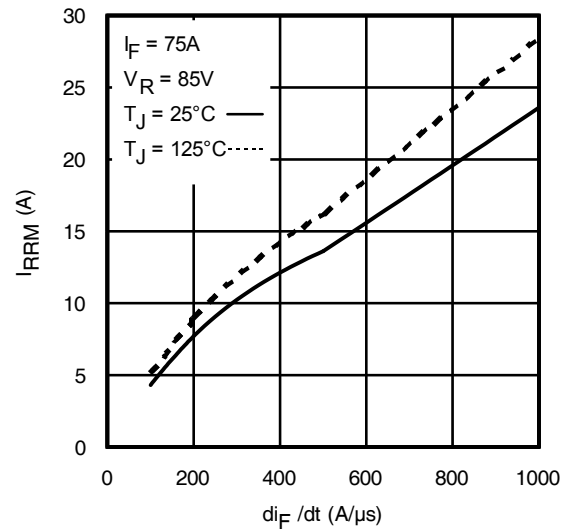
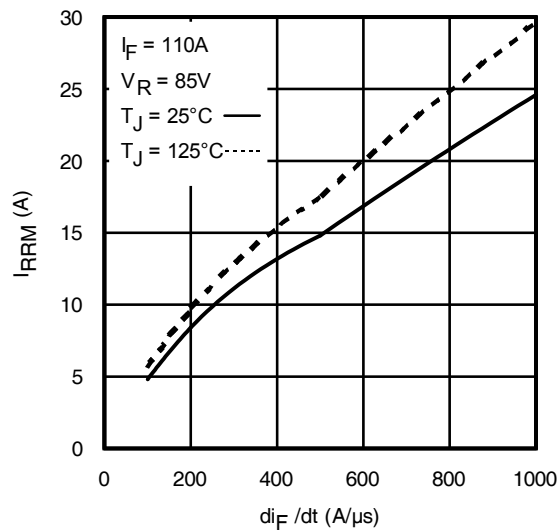
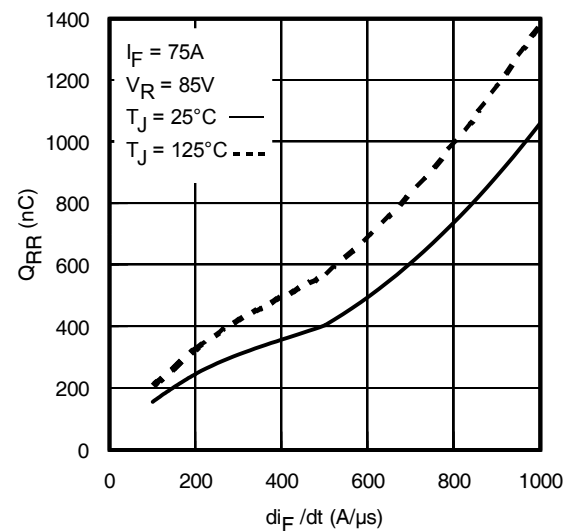
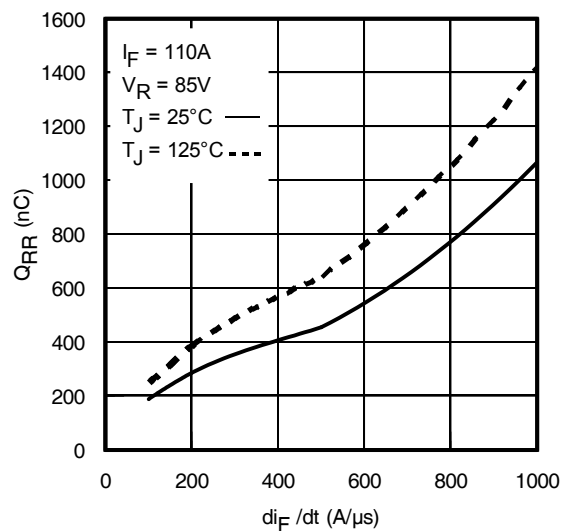
1. Avalanche failures assumption:  
Purely a thermal phenomenon and failure occurs at a temperature far in excess of  $T_{jmax}$ . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as  $T_{jmax}$  is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 18a, 18b.
4.  $P_{D(ave)}$  = Average power dissipation per single avalanche pulse.
5.  $BV$  = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6.  $I_{av}$  = Allowable avalanche current.
7.  $\Delta T$  = Allowable rise in junction temperature, not to exceed  $T_{jmax}$  (assumed as 25°C in Figure 13, 14).  
 $t_{av}$  = Average time in avalanche.  
 $D$  = Duty cycle in avalanche =  $t_{av} \cdot f$   
 $Z_{thJC}(D, t_{av})$  = Transient thermal resistance, see Figures 13)

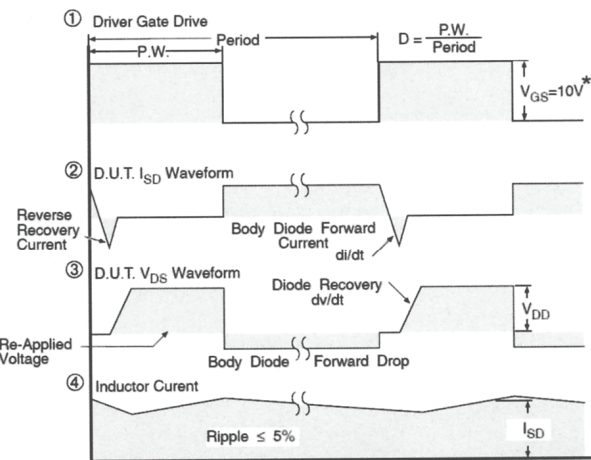
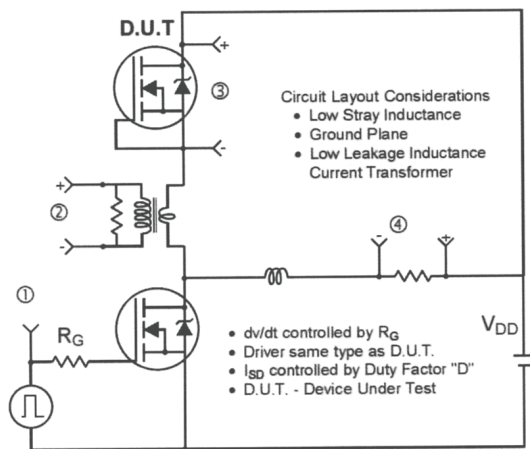
$$P_{D(ave)} = 1/2 (1.3 \cdot BV \cdot I_{av}) = \Delta T / Z_{thJC}$$

$$I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$$

$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$

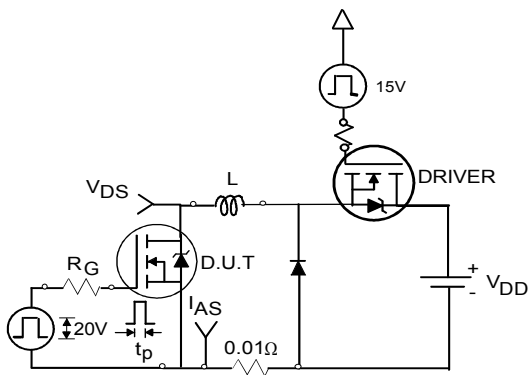
**Fig 15.** Maximum Avalanche Energy vs. Temperature


**Fig. 16.** Threshold Voltage vs. Temperature

**Fig. 17 -** Typical Recovery Current vs.  $di_F/dt$ 

**Fig. 18 -** Typical Recovery Current vs.  $di_F/dt$ 

**Fig. 19 -** Typical Stored Charge vs.  $di_F/dt$ 

**Fig. 20 -** Typical Stored Charge vs.  $di_F/dt$

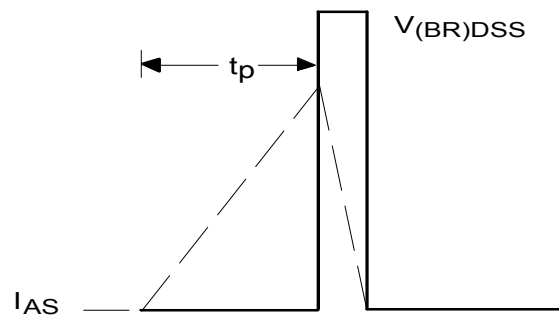


\*  $V_{GS} = 5V$  for Logic Level Devices

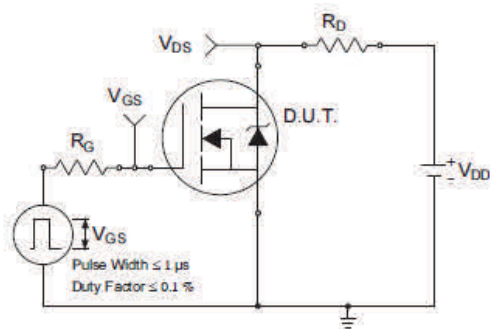
**Fig 21.** Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs



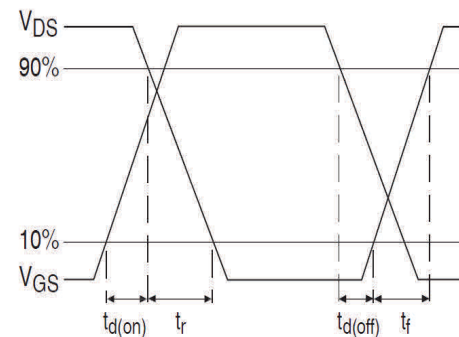
**Fig 22a.** Unclamped Inductive Test Circuit



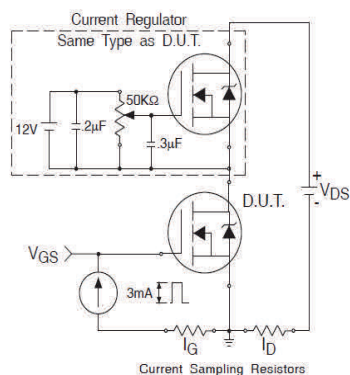
**Fig 22b.** Unclamped Inductive Waveforms



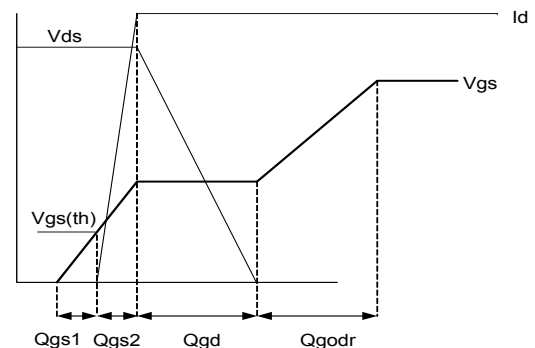
**Fig 23a.** Switching Time Test Circuit



**Fig 23b.** Switching Time Waveforms

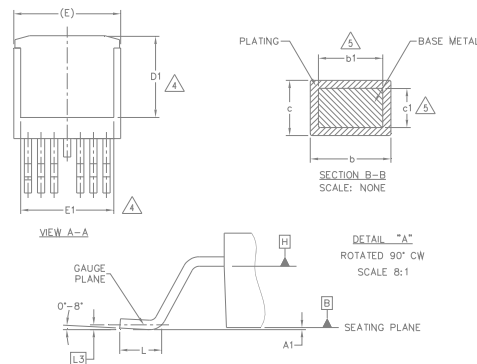
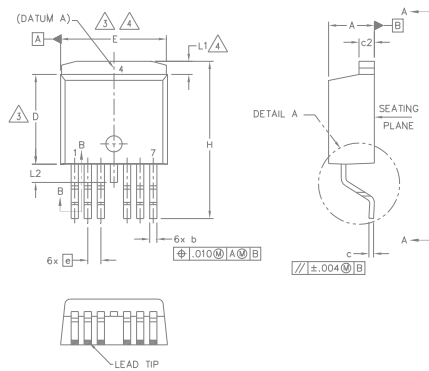


**Fig 24a.** Gate Charge Test Circuit



**Fig 24b.** Gate Charge Waveform

## D<sup>2</sup>Pak - 7 Pin Package Outline (Dimensions are shown in millimeters (inches))

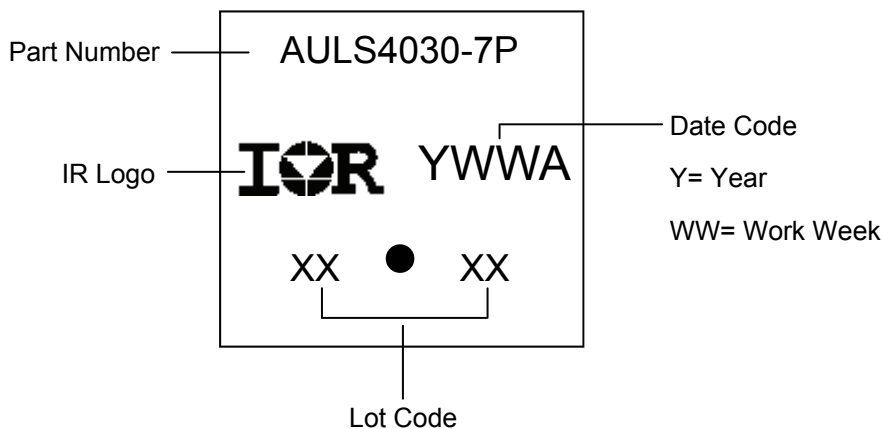


| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 4.06        | 4.83  | .160     | .190 | 5     |
| A1     | —           | 0.254 | —        | .010 |       |
| b      | 0.51        | 0.99  | .020     | .036 |       |
| b1     | 0.51        | 0.89  | .020     | .032 |       |
| c      | 0.38        | 0.74  | .015     | .029 | 5     |
| c1     | 0.38        | 0.58  | .015     | .023 |       |
| c2     | 1.14        | 1.65  | .045     | .065 |       |
| D      | 8.38        | 9.65  | .330     | .380 | 3     |
| D1     | 6.86        | 7.42  | .270     | .292 | 4     |
| E      | 9.65        | 10.54 | .380     | .415 | 3,4   |
| E1     | 6.22        | 8.48  | .245     | .334 | 4     |
| e      | 1.27 BSC    |       | .050 BSC |      |       |
| H      | 14.61       | 15.88 | .575     | .625 |       |
| L      | 1.78        | 2.79  | .070     | .110 | 4     |
| L1     | —           | 1.68  | —        | .066 |       |
| L2     | —           | 1.78  | —        | .070 |       |
| L3     | 0.25 BSC    |       | .010 BSC |      |       |

### NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263CB. EXCEPT FOR DIMS. E, E1 & D1.

## D<sup>2</sup>Pak - 7 Pin Part Marking Information



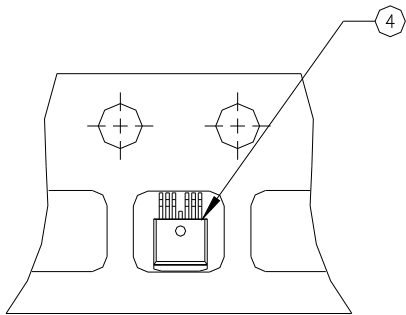


## D<sup>2</sup>Pak - 7 Pin Tape and Reel

### NOTES, TAPE & REEL, LABELLING:

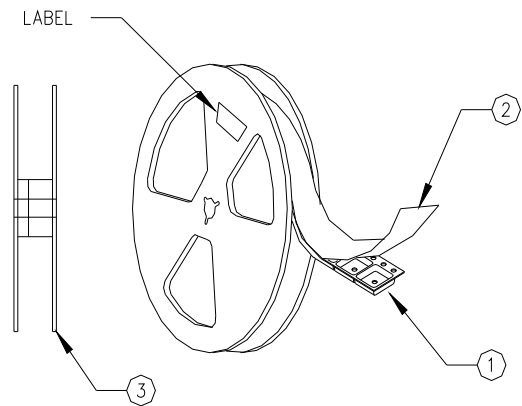
#### 1. TAPE AND REEL.

- 1.1 REEL SIZE 13 INCH DIAMETER.
- 1.2 EACH REEL CONTAINING 800 DEVICES.
- 1.3 THERE SHALL BE A MINIMUM OF 42 SEALED POCKETS CONTAINED IN THE LEADER AND A MINIMUM OF 15 SEALED POCKETS IN THE TRAILER.
- 1.4 PEEL STRENGTH MUST CONFORM TO THE SPEC. NO. 71-9667.
- 1.5 PART ORIENTATION SHALL BE AS SHOWN BELOW.
- 1.6 REEL MAY CONTAIN A MAXIMUM OF TWO UNIQUE LOT CODE/DATE CODE COMBINATIONS. REWORKED REELS MAY CONTAIN A MAXIMUM OF THREE UNIQUE LOT CODE/DATE CODE COMBINATIONS. HOWEVER, THE LOT CODES AND DATE CODES WITH THEIR RESPECTIVE QUANTITIES SHALL APPEAR ON THE BAR CODE LABEL FOR THE AFFECTED REEL.



#### 2. LABELLING (REEL AND SHIPPING BAG).

- 2.1 CUST. PART NUMBER (BAR CODE): IRFXXXXSTRL-7P
- 2.2 CUST. PART NUMBER (TEXT CODE): IRFXXXXSTRL-7P
- 2.3 I.R. PART NUMBER: IRFXXXXSTRL-7P
- 2.4 QUANTITY:
- 2.5 VENDOR CODE: IR
- 2.6 LOT CODE:
- 2.7 DATE CODE:



**Qualification Information**

|                                   |                      |                                                                                                                                                                               |      |
|-----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| <b>Qualification Level</b>        |                      | Automotive<br>(per AEC-Q101)                                                                                                                                                  |      |
|                                   |                      | Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. |      |
| <b>Moisture Sensitivity Level</b> |                      | D <sup>2</sup> -Pak 7 Pin                                                                                                                                                     | MSL1 |
| <b>ESD</b>                        | Machine Model        | Class M4 (+/- 800V) <sup>†</sup><br>AEC-Q101-002                                                                                                                              |      |
|                                   | Human Body Model     | Class H3A (+/- 6000V) <sup>†</sup><br>AEC-Q101-001                                                                                                                            |      |
|                                   | Charged Device Model | Class C5 (+/- 2000V) <sup>†</sup><br>AEC-Q101-005                                                                                                                             |      |
| <b>RoHS Compliant</b>             |                      | Yes                                                                                                                                                                           |      |

† Highest passing voltage.

**Revision History**

| Date       | Comments                                                                                                                                                                                                |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 03/03/2014 | <ul style="list-style-type: none"> <li>Added "Logic Level Gate Drive" bullet in the features section on page 1</li> <li>Updated data sheet with new IR corporate template</li> </ul>                    |
| 04/02/2014 | <ul style="list-style-type: none"> <li>Updated package outline and part marking on page 8 &amp; 9</li> <li>Updated typo on the fig.19 and fig.20, unit of y-axis from "A" to "nC" on page 6.</li> </ul> |
| 11/06/2015 | <ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> <li>Corrected ordering table on page 1.</li> </ul>                                                                |
| 10/10/2017 | <ul style="list-style-type: none"> <li>Corrected typo error on part marking on page 8.</li> </ul>                                                                                                       |

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