

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

|              |             |         |
|--------------|-------------|---------|
| ▶ Domestic   | Part Number | IRF3415 |
| ▶ Overseas   | Part Number | IRF3415 |
| ▶ Equivalent | Part Number | IRF3415 |

EV is the abbreviation of name EVVO

## Description:

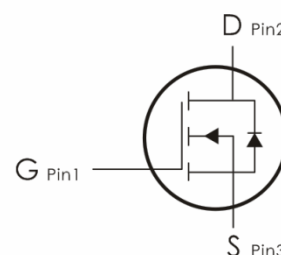
This N-Channel MOSFET uses advanced trench technology and

design to provide excellent  $R_{DS(on)}$  with low gate charge.

It can be used in a wide variety of applications.

## Features:

- 1)  $V_{DS}=150V, I_D=40A, R_{DS(on)} < 45m\Omega @ V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(on)}$ .
- 5) Excellent package for good heat dissipation.



## Absolute Maximum Ratings: ( $T_C=25^\circ C$ unless otherwise noted)

| Symbol         | Parameter                                                                    | Ratings  | Units      |
|----------------|------------------------------------------------------------------------------|----------|------------|
| $V_{DS}$       | Drain-Source Voltage                                                         | 150      | V          |
| $V_{GS}$       | Gate-Source Voltage                                                          | $\pm 20$ | V          |
| $I_D$          | Continuous Drain Current- $T_C=25^\circ C$                                   | 40       | A          |
|                | Continuous Drain Current- $T_C=100^\circ C$                                  | 29       |            |
| $E_{AS}$       | Single Pulse Avalanche Energy(note1)                                         | 310      | mJ         |
| $P_D$          | Power Dissipation                                                            | 140      | W          |
| $I_{AR}$       | Avalanche Current (note2)                                                    | 40       | A          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                             | -55-+175 | $^\circ C$ |
| $TL$           | Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | 300      | $^\circ C$ |

## Thermal Characteristics:

| Symbol          | Parameter                            | Max  | Units        |
|-----------------|--------------------------------------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 1.07 | $^\circ C/W$ |

**Electrical Characteristics:** ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)

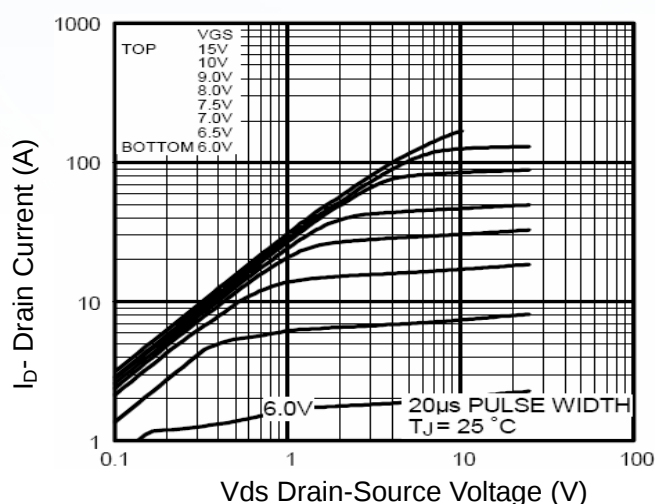
| Symbol                                        | Parameter                                 | Conditions                                                                                                            | Min | Typ  | Max   | Units |
|-----------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----|------|-------|-------|
| Off Characteristics                           |                                           |                                                                                                                       |     |      |       |       |
| BV <sub>DSS</sub>                             | Drain-Sourctce Breakdown Voltage          | V <sub>GS</sub> =0V,I <sub>D</sub> =250 μ A                                                                           | 150 | 170  | ---   | V     |
| I <sub>DSS</sub>                              | Zero Gate Voltage Drain Current           | V <sub>GS</sub> =0V, V <sub>DS</sub> =150V                                                                            | --- | ---  | 1     | μ A   |
| I <sub>GSS</sub>                              | Gate-Source Leakage Current               | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0A                                                                           | --- | ---  | ± 100 | nA    |
| On Characteristics <sup>(Note 3)</sup>        |                                           |                                                                                                                       |     |      |       |       |
| V <sub>GS(th)</sub>                           | GATE-Source Threshold Voltage             | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 μ A                                                            | 2.5 | 3.2  | 4.5   | V     |
| R <sub>DS(ON)</sub>                           | Drain-Source On Resistance                | V <sub>GS</sub> =10V,I <sub>D</sub> =18A                                                                              | --- | 35   | 45    | m Ω   |
| G <sub>FS</sub>                               | Forward Transconductance                  | V <sub>DS</sub> =15V,I <sub>D</sub> =18A                                                                              | 38  | ---  | ---   | S     |
| Dynamic Characteristics <sup>(Note 4)</sup>   |                                           |                                                                                                                       |     |      |       |       |
| C <sub>iss</sub>                              | Input Capacitance                         | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                                                     | --- | 3850 | ---   | pF    |
| C <sub>oss</sub>                              | Output Capacitance                        |                                                                                                                       | --- | 185  | ---   |       |
| C <sub>rss</sub>                              | Reverse Transfer Capacitance              |                                                                                                                       | --- | 86   | ---   |       |
| Switching Characteristics <sup>(Note 4)</sup> |                                           |                                                                                                                       |     |      |       |       |
| t <sub>d(on)</sub>                            | Turn-On Delay Time                        | V <sub>DD</sub> =30V, , I <sub>D</sub> =2A, R <sub>L</sub> =15 Ω<br><br>V <sub>GS</sub> =10V ,R <sub>G</sub> =2.5 Ω . | --- | 17.8 | ---   | ns    |
| t <sub>r</sub>                                | Rise Time                                 |                                                                                                                       | --- | 11.8 | ---   | ns    |
| t <sub>d(off)</sub>                           | Turn-Off Delay Time                       |                                                                                                                       | --- | 56   | ---   | ns    |
| t <sub>f</sub>                                | Fall Time                                 |                                                                                                                       | --- | 14.6 | ---   | ns    |
| Q <sub>g</sub>                                | Total Gate Charge                         | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V<br><br>I <sub>D</sub> =30A                                                 | --- | 105  | ---   | nC    |
| Q <sub>gs</sub>                               | Gate-Source Charge                        |                                                                                                                       | --- | 21   | ---   | nC    |
| Q <sub>gd</sub>                               | Gate-Drain Charge                         |                                                                                                                       | --- | 31.5 | ---   | nC    |
| Drain-Source Diode Characteristics            |                                           |                                                                                                                       |     |      |       |       |
| V <sub>SD</sub>                               | Diode Forward Voltage <sup>(Note 3)</sup> | V <sub>GS</sub> =0V ,I <sub>S</sub> =18A                                                                              | --- | 0.82 | 1.2   | V     |
| I <sub>S</sub>                                | Diode Forward Current <sup>(Note 2)</sup> | ---                                                                                                                   | --- | ---  | 40    | A     |

|            |                         |                                                                                  |     |     |     |    |
|------------|-------------------------|----------------------------------------------------------------------------------|-----|-----|-----|----|
| <b>Trr</b> | Reverse Recovery Time   | T <sub>J</sub> = 25°C, I <sub>F</sub> = 18A<br>diF/dt=100A/μs <sup>(Note3)</sup> | --- | 70  | --- | NS |
| <b>Qrr</b> | Reverse Recovery Charge |                                                                                  | --- | 230 | --- | NC |

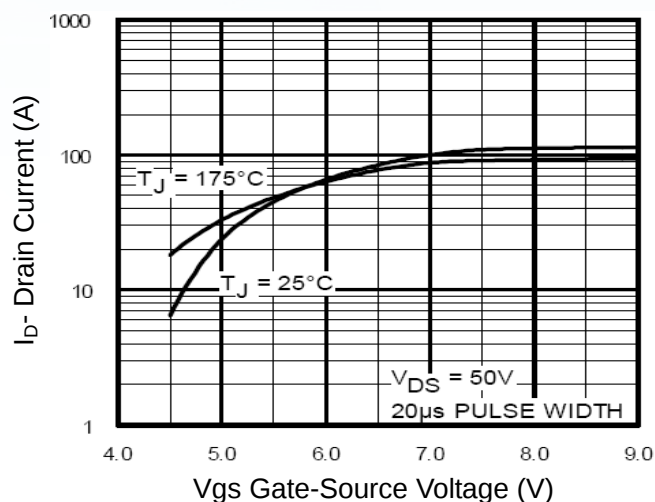
## Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition: T<sub>J</sub>=25°C, V<sub>DS</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω

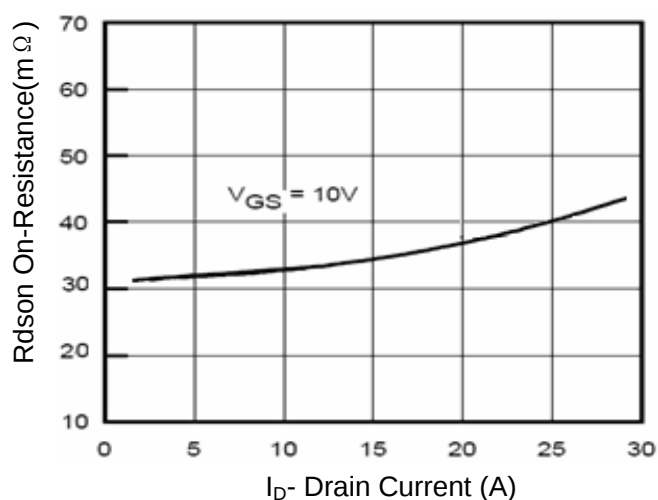
## Typical Characteristics: (T<sub>C</sub>=25°C unless otherwise noted)



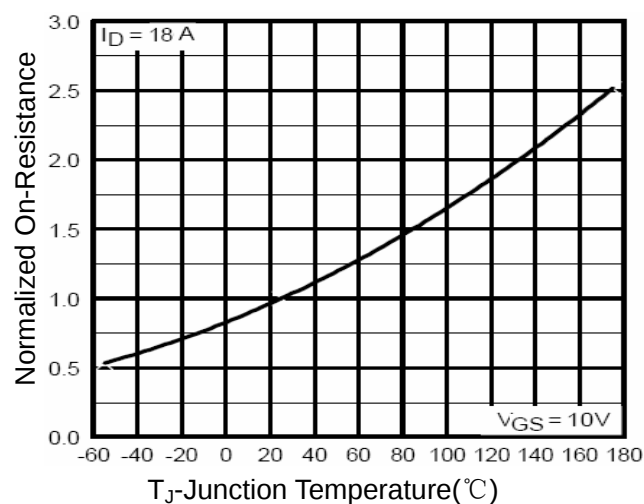
**Figure 1 Output Characteristics**



**Figure 2 Transfer Characteristics**



**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**

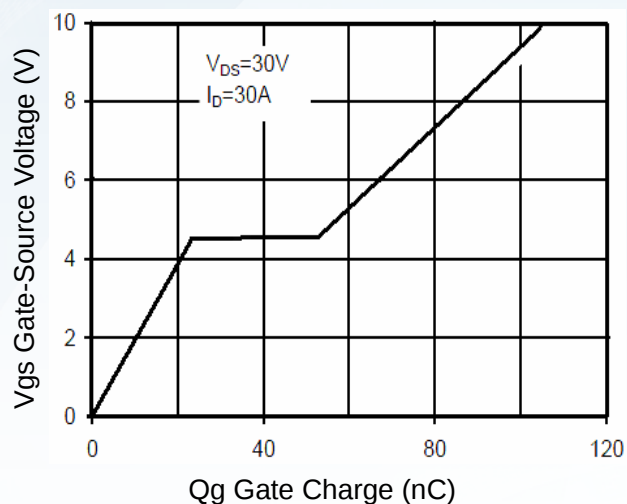


Figure 5 Gate Charge

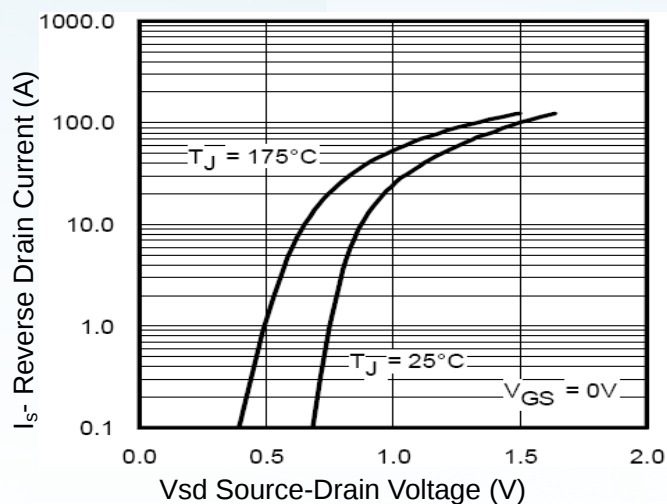


Figure 6 Source- Drain Diode Forward

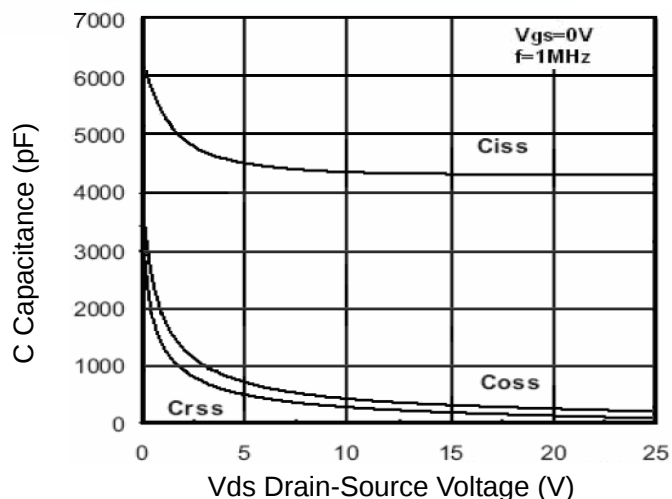


Figure 7 Capacitance vs Vds

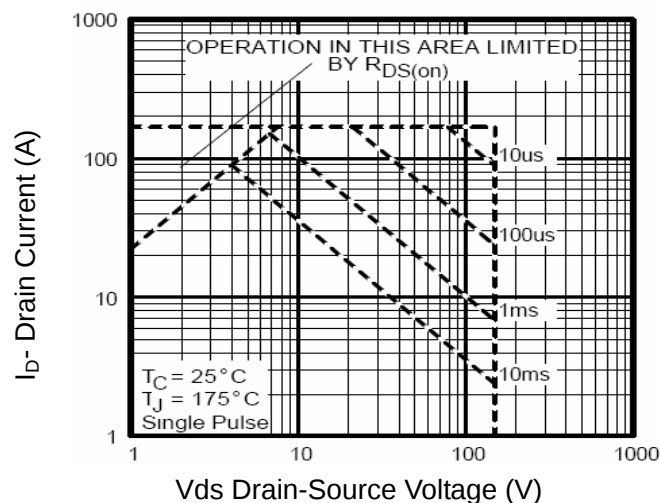


Figure 8 Safe Operation Area

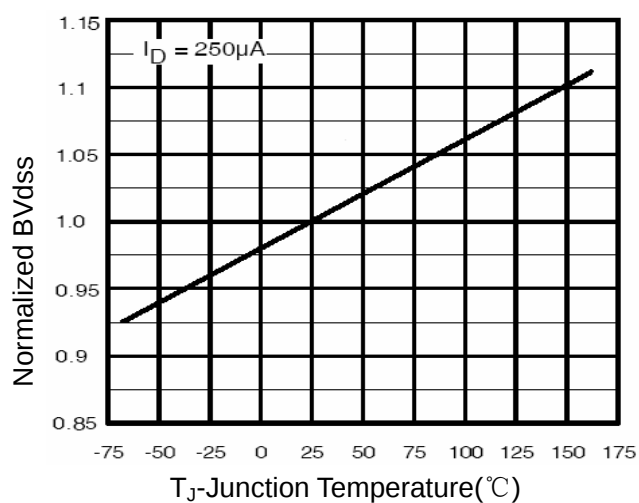


Figure 9  $BV_{DSS}$  vs Junction Temperature

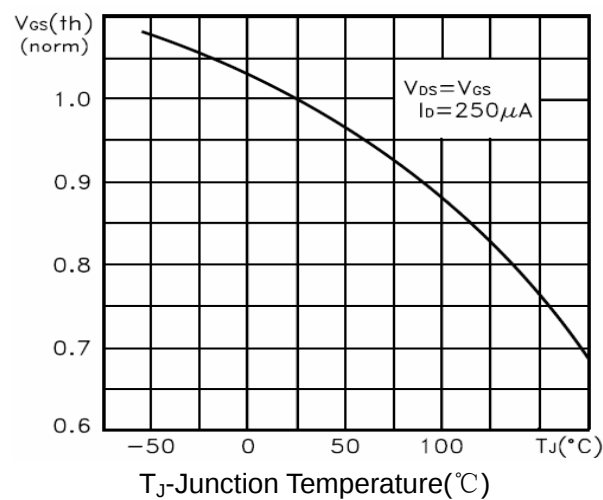


Figure 10  $V_{GS(th)}$  vs Junction Temperature

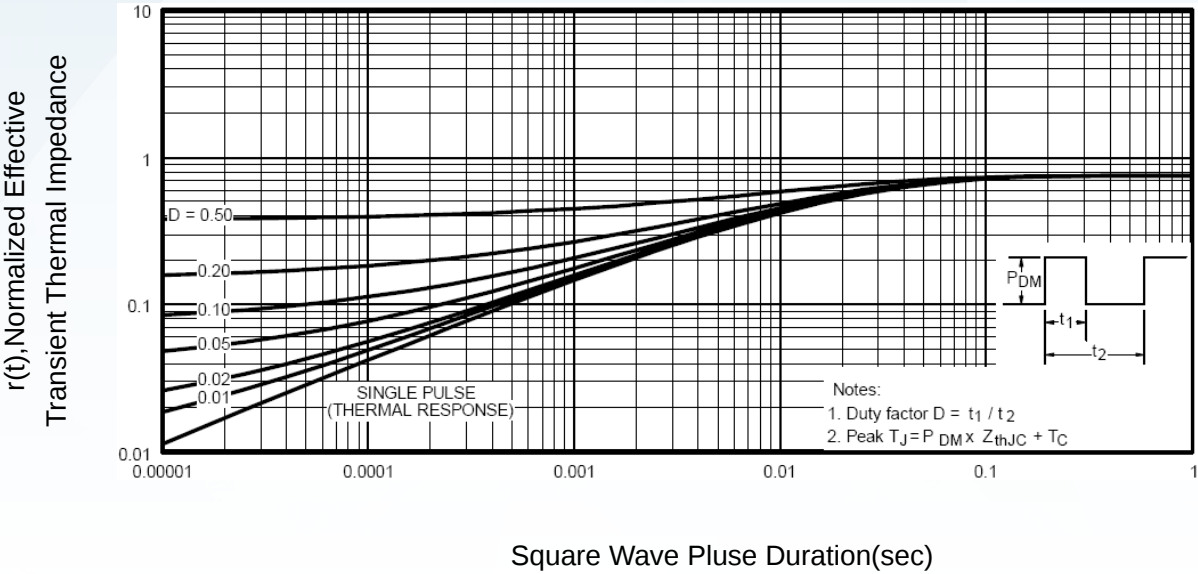


Figure 11 Normalized Maximum Transient Thermal Impedance

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