

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

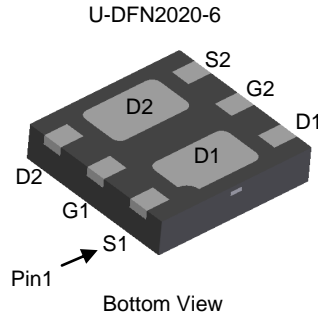
| Device | V _{(BR)DSS} | R _{DS(ON)} max | I _D MAX T _A = +25°C |
|-----------------|----------------------|---------------------------------|--|
| Q1 N-Channel | 12V | 29mΩ @ V _{GS} = 4.5V | 5.6A |
| | | 34mΩ @ V _{GS} = 2.5V | 5.1A |
| | | 44mΩ @ V _{GS} = 1.8V | 4.5A |
| | | 65mΩ @ V _{GS} = 1.5V | 3.7A |
| Q2 P-Channel | -12V | 61mΩ @ V _{GS} = -4.5V | -3.8A |
| | | 81mΩ @ V _{GS} = -2.5V | -3.3A |
| | | 115mΩ @ V _{GS} = -1.8V | -2.8A |
| | | 210mΩ @ V _{GS} = -1.5V | -2.3A |

Description

This MOSFET has been designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications


- Load Switch
- Power Management Functions
- Portable Power Adaptors

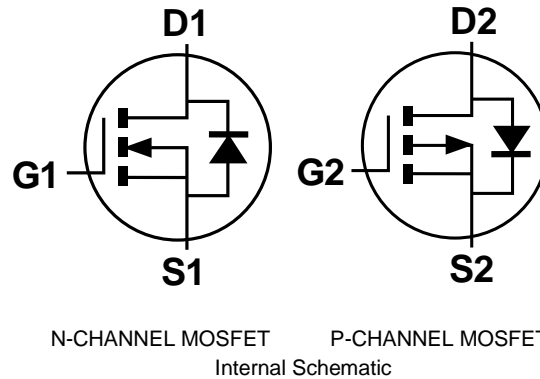


Features

- Low On-Resistance
- Low Input Capacitance
- Low Profile, 0.6mm Max Height
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: U-DFN2020-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Terminals Connections: See Diagram Below
- Weight: 0.0065 grams (Approximate)

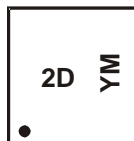


Ordering Information (Note 4)

| Part Number | Case | Packaging |
|-----------------|-------------|-------------------|
| DMC1029UFDB -7 | U-DFN2020-6 | 3000/Tape & Reel |
| DMC1029UFDB -13 | U-DFN2020-6 | 10000/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

Marking Information



2D = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: B = 2014)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | | | | | |
|-------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|
| Code | B | C | D | E | F | G | H | | | | | |
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Q1 N-CHANNEL | Q2 P-CHANNEL | Units |
|--|--------------|--|------------------|-----------------|-----------------|-------|
| Drain-Source Voltage | | | V _{DSS} | 12 | -12 | V |
| Gate-Source Voltage | | | V _{GSS} | ±8 | ±8 | V |
| Continuous Drain Current (Note 5) V _{GS} = 4.5V | Steady State | T _A = +25°C T _A = +70°C | I _D | 5.6 4.4 | -3.8 -3.0 | A |
| | t < 5s | T _A = +25°C T _A = +70°C | I _D | 7.2 5.8 | -5.0 -4.0 | A |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | I _S | 1 | -1 | A |
| Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%) | | | I _{DM} | 20 | -15 | A |
| Avalanche Current (L = 0.1mH) | | | I _{AS} | 15 | -12 | A |
| Avalanche Energy (L = 0.1mH) | | | E _{AS} | 12 | 8 | mJ |

Thermal Characteristics

| Characteristic | | Symbol | Value | Units |
|--|--------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5) | Steady State | P _D | 1.4 | W |
| | t < 5s | | 2.2 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | R _{θJA} | 91 | °C/W |
| | t < 5s | | 55 | |
| Thermal Resistance, Junction to Case | | R _{θJC} | 20 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Note: 5. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.

Electrical Characteristics Q1 N-CHANNEL (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|-----|------|------|------|---|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 12 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | 1.0 | μA | V _{DS} = 12V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 0.4 | — | 1 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 17 | 29 | mΩ | V _{GS} = 4.5V, I _D = 5A |
| | | — | 20 | 34 | | V _{GS} = 2.5V, I _D = 4.6A |
| | | — | 24 | 44 | | V _{GS} = 1.8V, I _D = 4.1A |
| | | — | 30 | 65 | | V _{GS} = 1.5V, I _D = 2A |
| Diode Forward Voltage | V _{SD} | — | 0.6 | 1.2 | V | V _{GS} = 0V, I _S = 1A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iss} | — | 914 | — | pF | V _{DS} = 6V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 132 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 119 | — | pF | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Gate Resistance | R _g | — | 1.26 | — | Ω | |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 10.5 | — | nC | V _{DS} = 6V, I _D = 6.5A |
| Total Gate Charge (V _{GS} = 8V) | | — | 19.6 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 1.2 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 1.6 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.0 | — | ns | |
| Turn-On Rise Time | t _r | — | 10.5 | — | ns | V _{DD} = 6V, V _{GS} = 4.5V, R _L = 1.2Ω, R _G = 1Ω |
| Turn-Off Delay Time | t _{D(OFF)} | — | 16.6 | — | ns | |
| Turn-Off Fall Time | t _f | — | 4.1 | — | ns | |

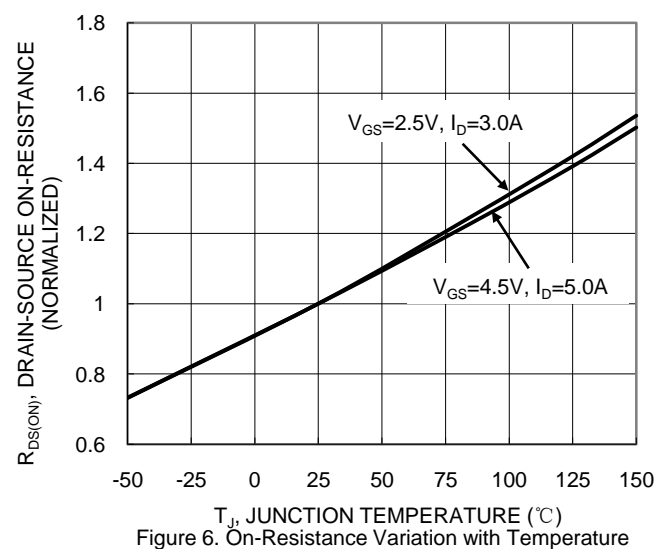
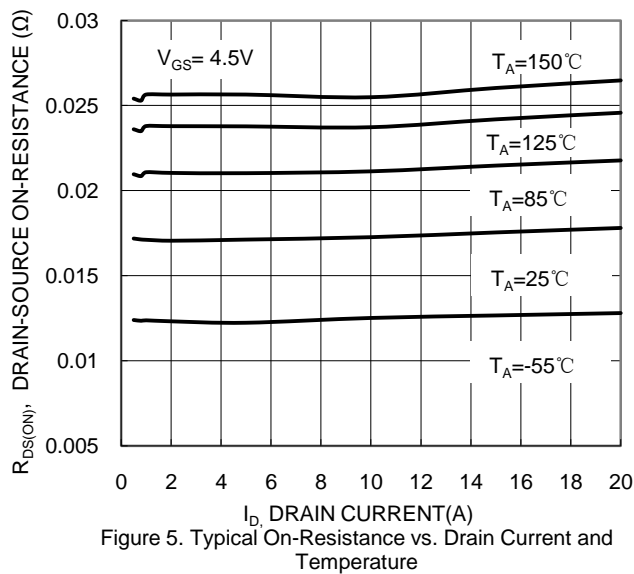
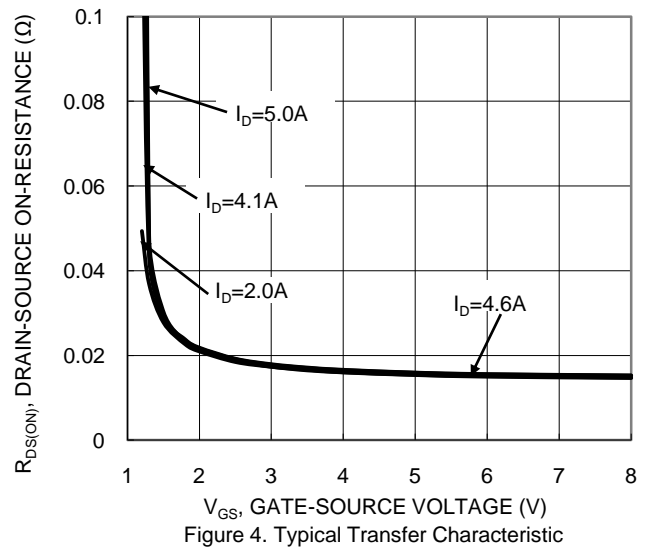
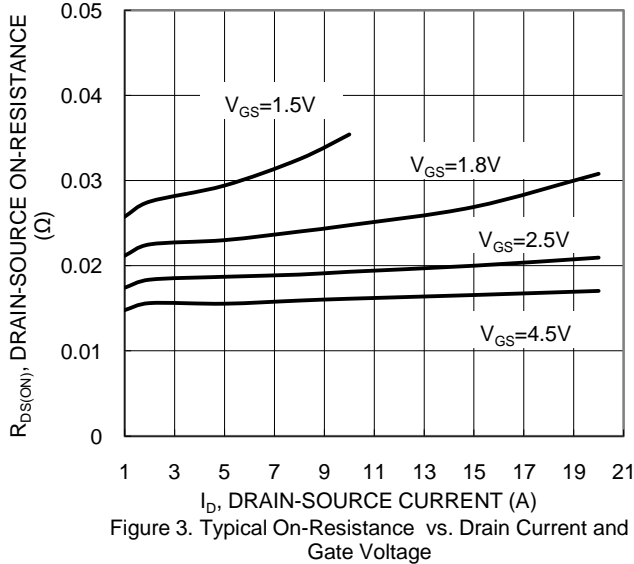
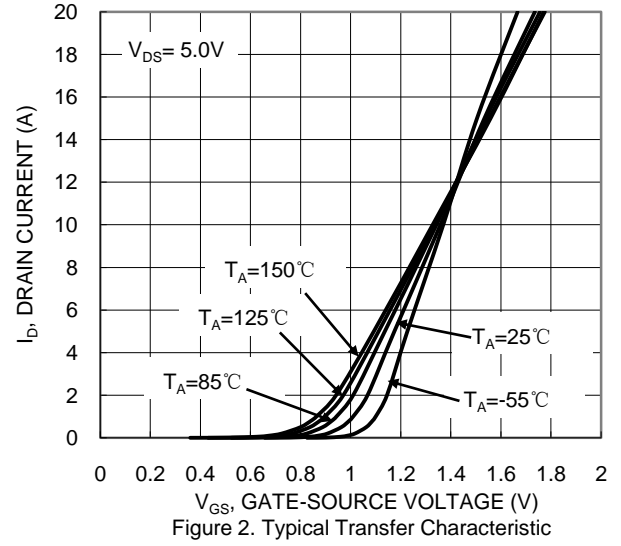
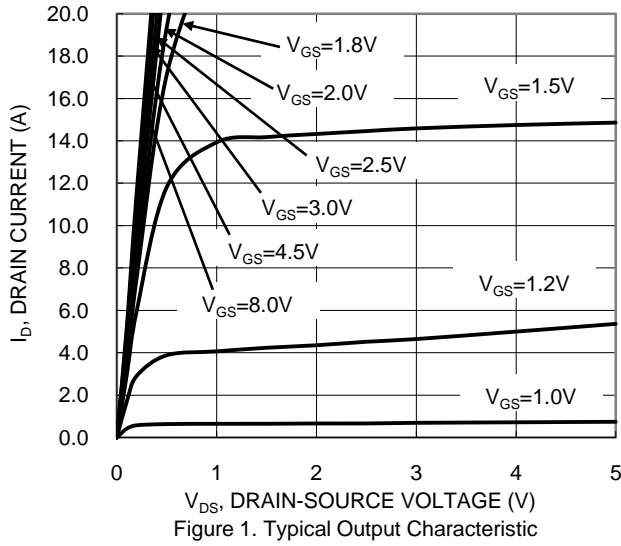
Electrical Characteristics Q2 P-CHANNEL (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|---------------------|------|-------|------|------|---|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -12 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current T _J = +25°C | I _{DSS} | — | — | -1.0 | μA | V _{DS} = -12V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±8V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -0.4 | — | -1 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 37 | 61 | mΩ | V _{GS} = -4.5V, I _D = -3.6A |
| | | — | 47 | 81 | | V _{GS} = -2.5V, I _D = -3.2A |
| | | — | 63 | 115 | | V _{GS} = -1.8V, I _D = -1A |
| | | — | 90 | 210 | | V _{GS} = -1.5V, I _D = -1A |
| Diode Forward Voltage | V _{SD} | — | -0.65 | -1.2 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{iss} | — | 915 | — | pF | V _{DS} = -6V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{oss} | — | 225 | — | pF | |
| Reverse Transfer Capacitance | C _{rss} | — | 183 | — | pF | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Gate Resistance | R _g | — | 56.9 | — | Ω | |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 10.7 | — | nC | V _{DS} = -6V, I _D = -4.3A |
| Total Gate Charge (V _{GS} = -8V) | | — | 17.9 | — | nC | |
| Gate-Source Charge | Q _{gs} | — | 1.7 | — | nC | |
| Gate-Drain Charge | Q _{gd} | — | 3.0 | — | nC | |
| Turn-On Delay Time | t _{D(ON)} | — | 5.7 | — | ns | |
| Turn-On Rise Time | t _r | — | 11.5 | — | ns | V _{DD} = -6V, V _{GS} = -4.5V, R _L = 1.6Ω, R _G = 1Ω |
| Turn-Off Delay Time | t _{D(OFF)} | — | 27.8 | — | ns | |
| Turn-Off Fall Time | t _f | — | 26.4 | — | ns | |

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to product testing.

Typical Characteristics - N-CHANNEL

NEW PRODUCT



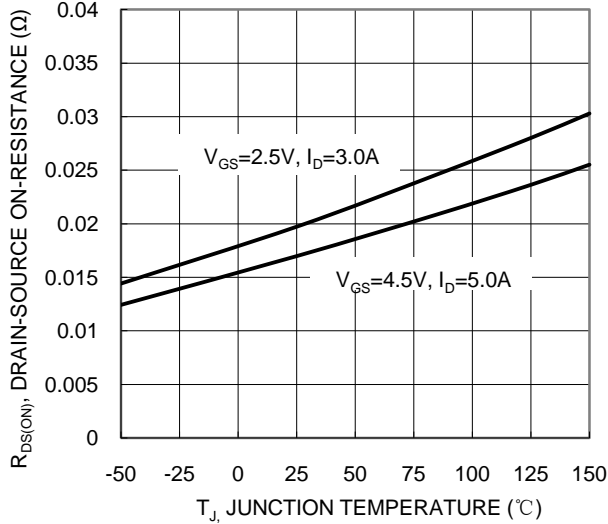


Figure 7. On-Resistance Variation with Temperature

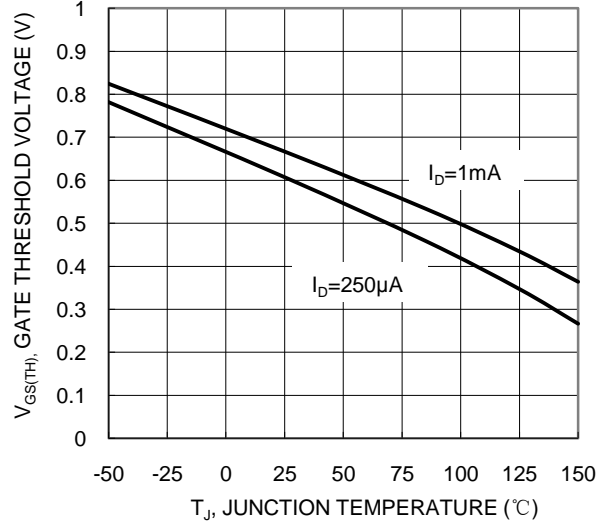


Figure 8. Gate Threshold Variation vs. Junction Temperature

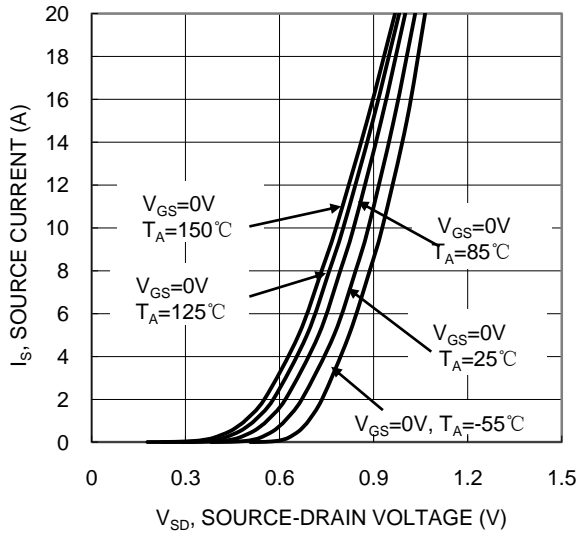


Figure 9. Diode Forward Voltage vs. Current

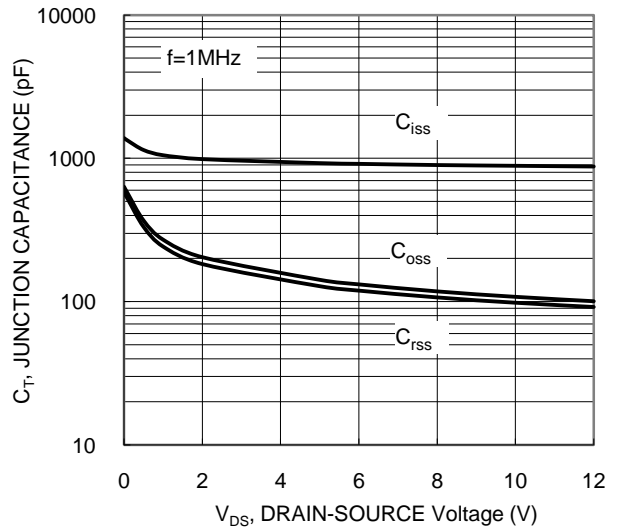


Figure 10. Typical Junction Capacitance

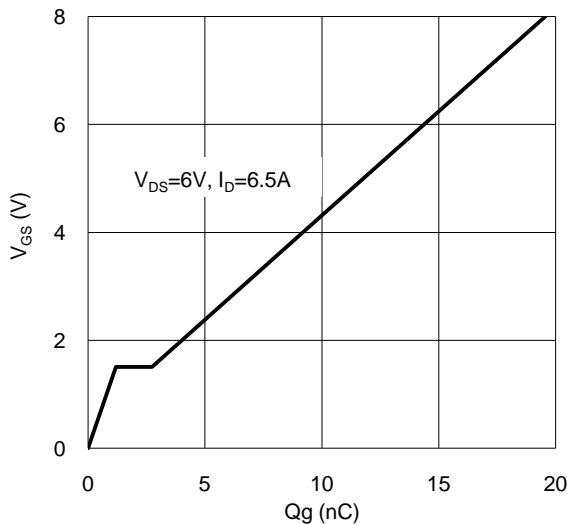


Figure 11. Gate Charge

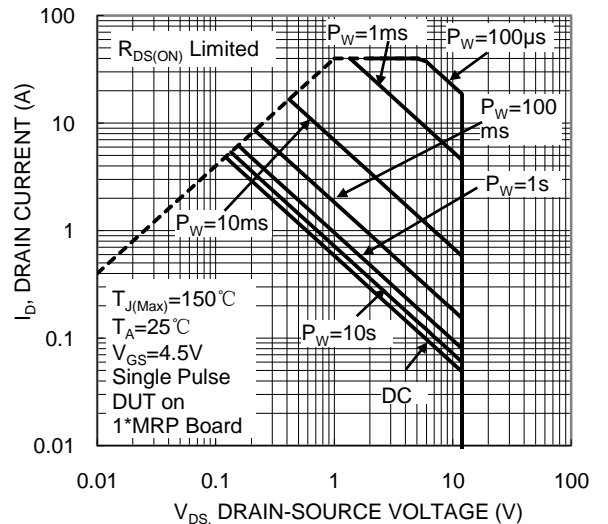
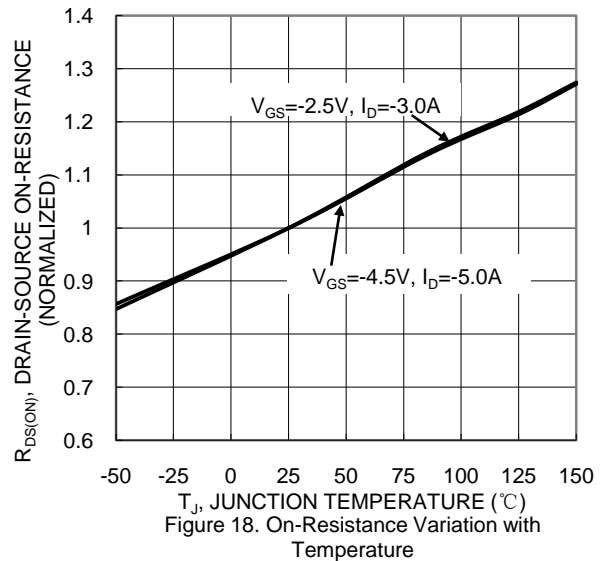
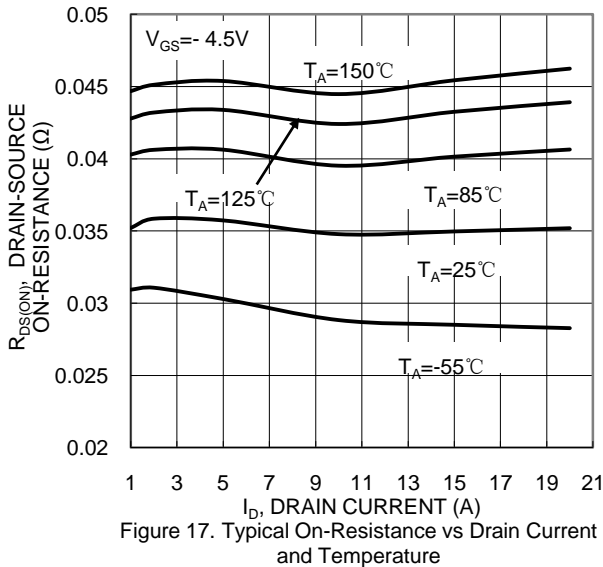
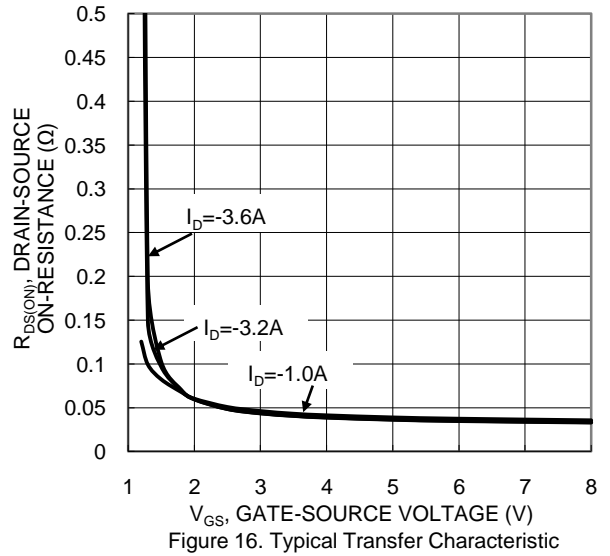
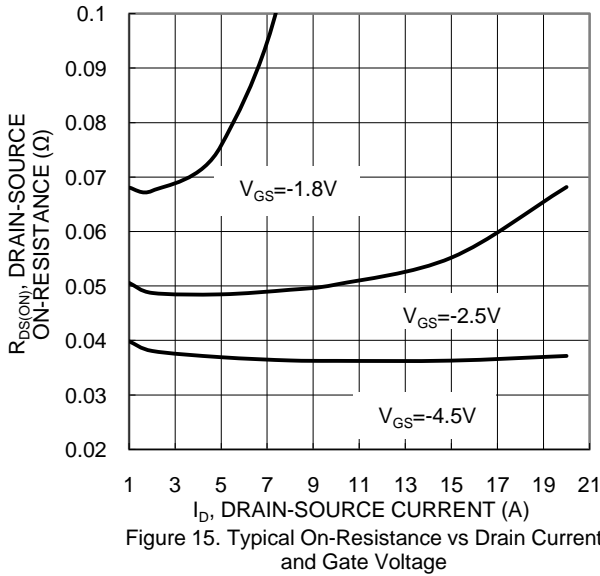
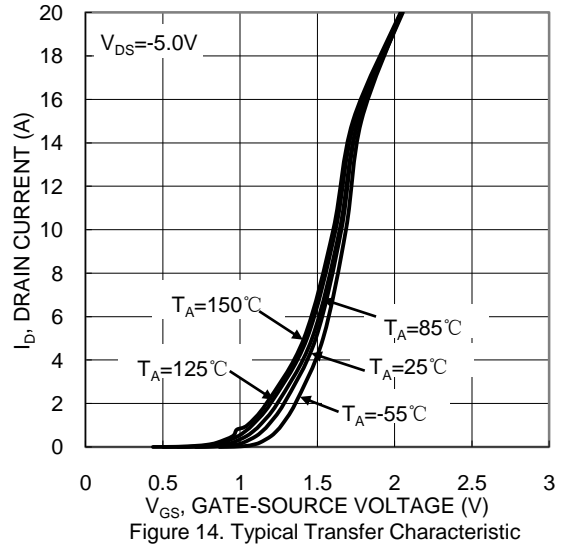
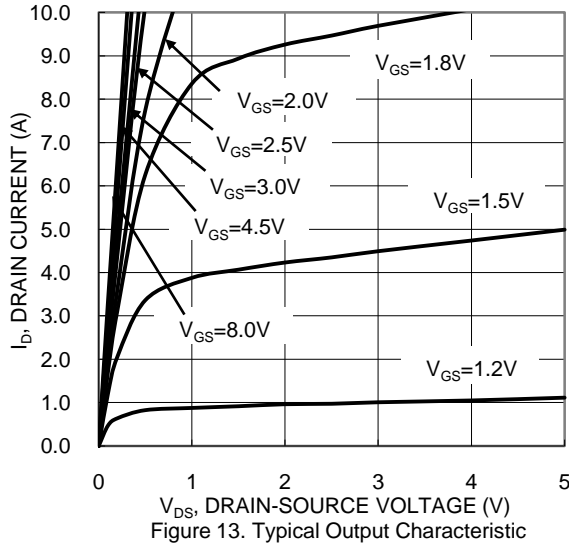


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

NEW PRODUCT



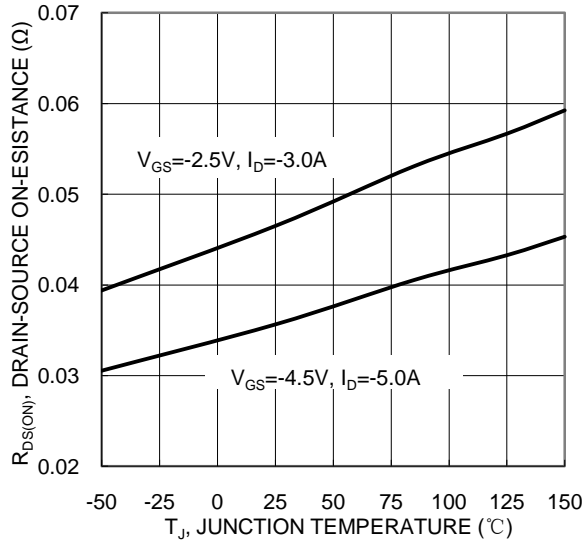


Figure 19. On-Resistance Variation with Temperature

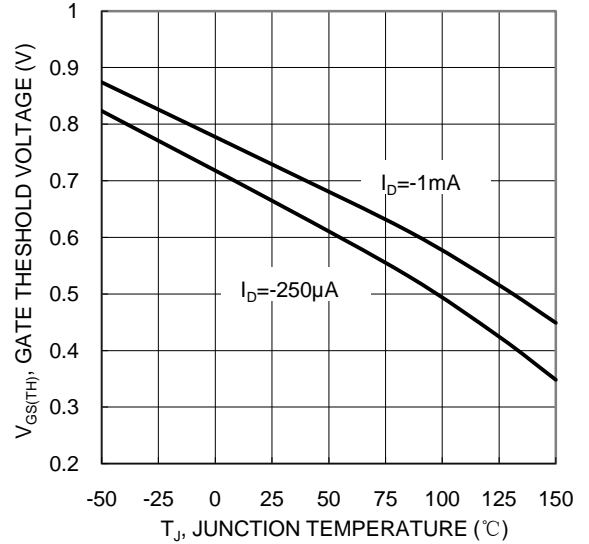


Figure 20. Gate Threshold Variation vs Junction Temperature

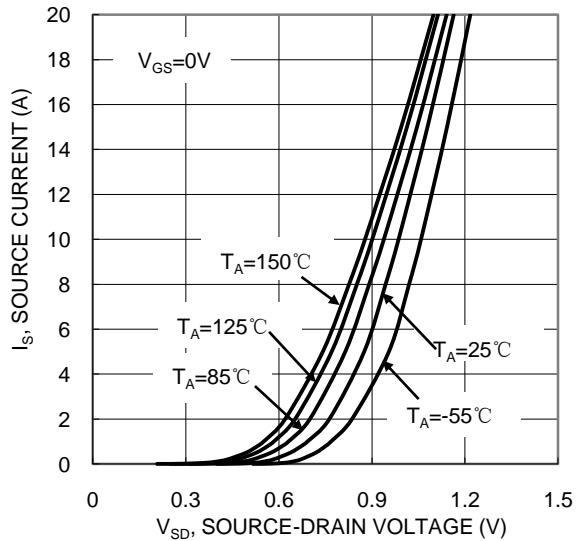


Figure 21. Diode Forward Voltage vs. Current

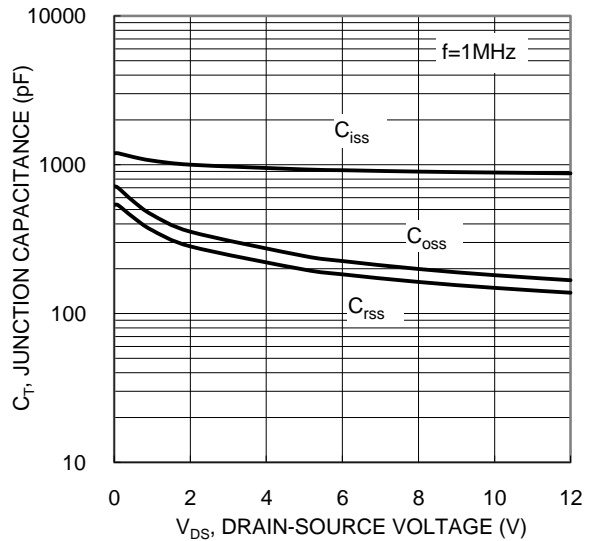


Figure 22. Typical Junction Capacitance

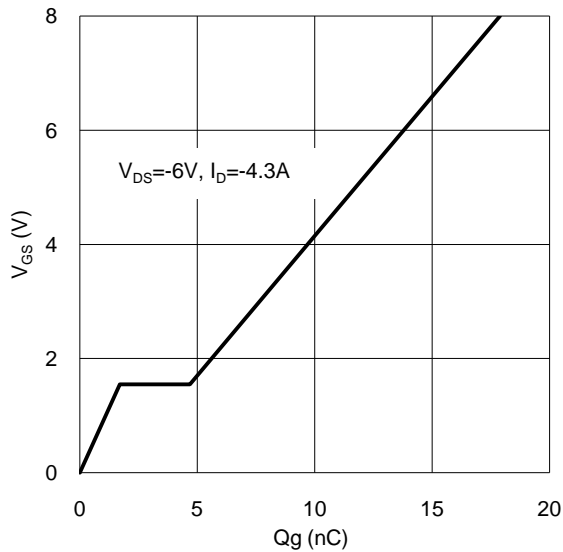


Figure 23. Gate Charge

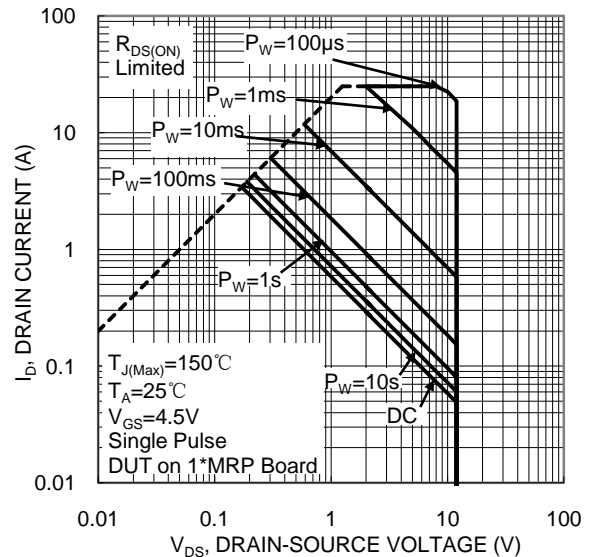


Figure 24. SOA, Safe Operation Area

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- Техническая поддержка проекта;
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