

Product Summary

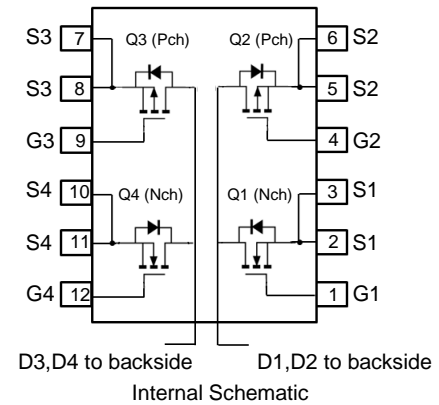
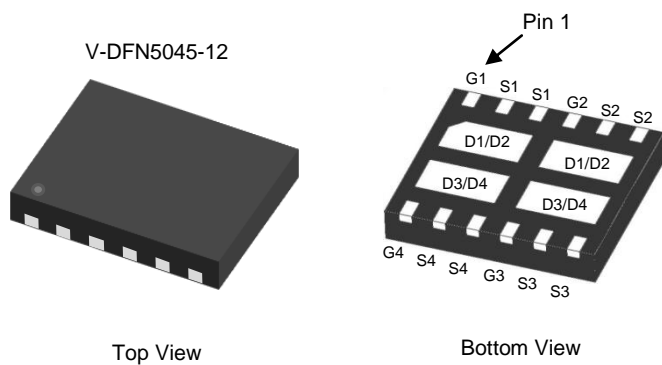
| Device | BV _{DSS} | R _{DS(ON)} MAX | I _D T _A = +25°C |
|---------|-------------------|---------------------------------|--|
| Q1 & Q4 | 100V | 160mΩ @ V _{GS} = 10V | 2.9A |
| | | 200mΩ @ V _{GS} = 4.5V | 2.6A |
| Q2 & Q3 | -100V | 250mΩ @ V _{GS} = -10V | -2.3A |
| | | 300mΩ @ V _{GS} = -4.5V | -2.1A |

Description

This new generation MOSFET is 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

- High-Efficiency Bridge Rectifiers

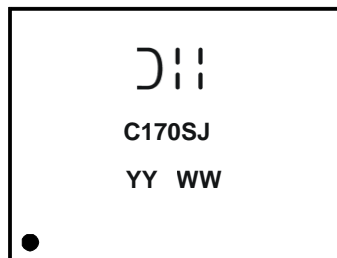


Ordering Information (Note 4)

| Part Number | Case | Tape Width | Packaging |
|------------------|--------------|------------|-------------------|
| DMHC10H170SFJ-13 | V-DFN5045-12 | 12mm | 3,000/Tape & Reel |

- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 - 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



DII = Manufacturer's Marking
 C170SJ = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Last Two Digits of Year (ex: 16 = 2016)
 WW = Week Code (01 to 53)

Maximum Ratings Q1 & Q4 N-Channel (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | 100 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 5) V _{GS} = 10V | Steady State | T _A = +25°C | I _D | 2.9 | A |
| | | T _A = +70°C | | 2.3 | |
| Maximum Body Diode Forward Current (Note 5) | | | I _S | 2.5 | A |
| Pulsed Drain Current (10µs pulse, Duty Cycle = 1%) | | | I _{DM} | 13 | A |

Maximum Ratings Q2 & Q3 P-Channel (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage | | | V _{DSS} | -100 | V |
| Gate-Source Voltage | | | V _{GSS} | ±20 | V |
| Continuous Drain Current (Note 5) V _{GS} = -10V | Steady State | T _A = +25°C | I _D | -2.3 | A |
| | | T _A = +70°C | | -1.9 | |
| Maximum Body Diode Forward Current (Note 5) | | | I _S | -2.4 | A |
| Pulsed Drain Current (10µs pulse, Duty Cycle = 1%) | | | I _{DM} | -11 | A |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|--|------------------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | T _A = +25°C | P _D | 2.1 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | | R _{θJA} | 60 | °C/W |
| Thermal Resistance, Junction to Case (Note 5) | | R _{θJC} | 6 | |
| Operating and Storage Temperature Range | | T _J , T _{STG} | -55 to +150 | °C |

Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.

Electrical Characteristics Q1 & Q4 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} | 100 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = 80V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | 1.0 | 2.0 | 3.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 111 | 160 | mΩ | V _{GS} = 10V, I _D = 5A |
| | | — | 121 | 200 | | V _{GS} = 4.5V, I _D = 5A |
| Diode Forward Voltage | V _{SD} | — | 0.9 | 1.0 | V | V _{GS} = 0V, I _S = 10A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1,167 | — | pF | V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 36 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 25 | — | | |
| Gate Resistance | R _G | — | 1.3 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = 4.5V) | Q _g | — | 4.9 | — | nC | V _{DS} = 80V, I _D = 12.8A |
| Total Gate Charge (V _{GS} = 10V) | Q _g | — | 9.7 | — | | |
| Gate-Source Charge | Q _{gs} | — | 2.0 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 2.0 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 10.5 | — | ns | V _{DD} = 50V, R _G = 25Ω, I _D = 12.8A |
| Turn-On Rise Time | t _R | — | 11.1 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 42.6 | — | | |
| Turn-Off Fall Time | t _F | — | 12.8 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 30.3 | — | ns | V _{GS} = 0V, I _S = 12.8A, di/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 35.2 | — | nC | V _{GS} = 0V, I _S = 12.8A, di/dt = 100A/μs |

Electrical Characteristics Q2 & Q3 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} | -100 | — | — | V | V _{GS} = 0V, I _D = -250μA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 1 | μA | V _{DS} = -80V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1.0 | -1.6 | -3.0 | V | V _{DS} = V _{GS} , I _D = -250μA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 191 | 250 | mΩ | V _{GS} = -10V, I _D = -5A |
| | | — | 213 | 300 | | V _{GS} = -4.5V, I _D = -5A |
| Diode Forward Voltage | V _{SD} | — | -0.9 | -1.2 | V | V _{GS} = 0V, I _S = -5A |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C _{ISS} | — | 1,239 | — | pF | V _{DS} = -25V, V _{GS} = 0V, f = 1.0MHz |
| Output Capacitance | C _{OSS} | — | 42 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 28 | — | | |
| Gate Resistance | R _G | — | 13 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 8.4 | — | nC | V _{DS} = -60V, I _D = -5A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 17.5 | — | | |
| Gate-Source Charge | Q _{gs} | — | 2.8 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 3.2 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 9.1 | — | ns | V _{DD} = -50V, R _G = 9.1Ω, I _D = -5A |
| Turn-On Rise Time | t _R | — | 14.9 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 57.4 | — | | |
| Turn-Off Fall Time | t _F | — | 34.4 | — | | |
| Body Diode Reverse Recovery Time | t _{RR} | — | 25.2 | — | ns | V _{GS} = 0V, I _S = -5A, di/dt = 100A/μs |
| Body Diode Reverse Recovery Charge | Q _{RR} | — | 24.5 | — | nC | V _{GS} = 0V, I _S = -5A, di/dt = 100A/μs |

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

Typical Characteristics - N-CHANNEL

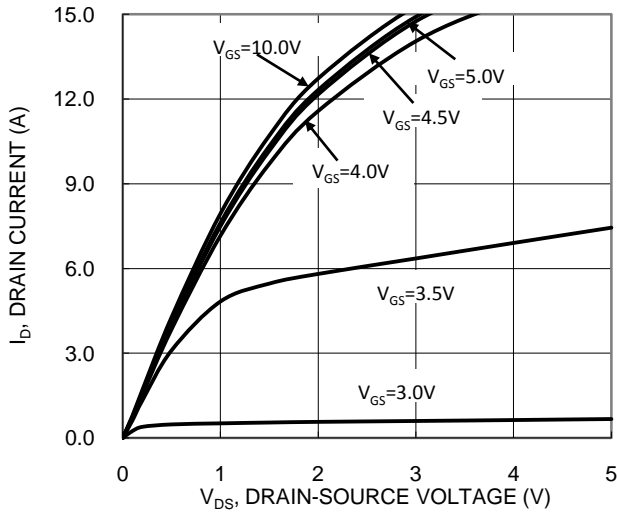


Figure 1. Typical Output Characteristic

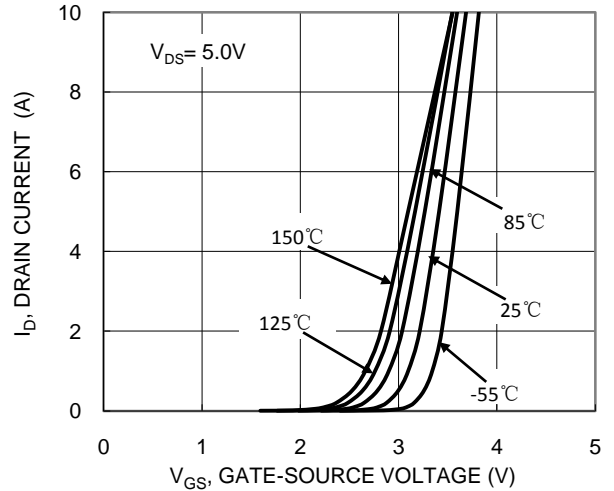


Figure 2. Typical Transfer Characteristic

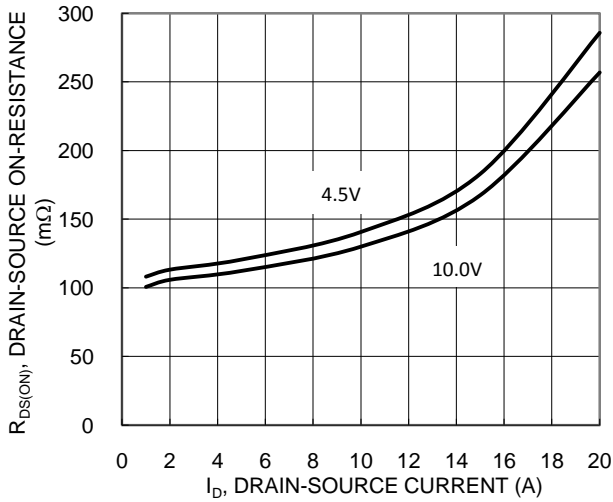


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

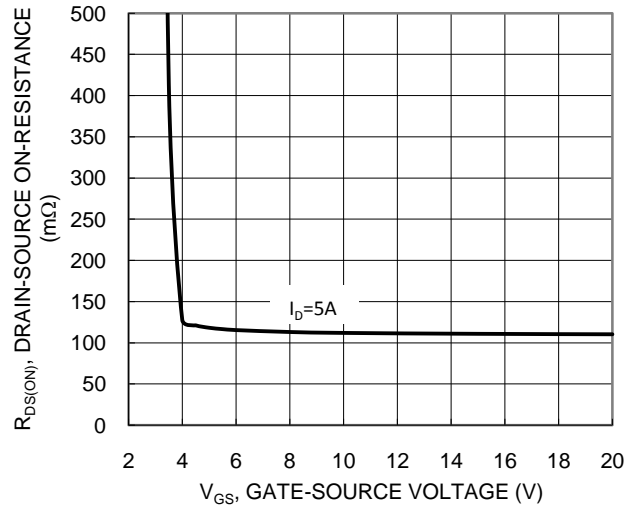


Figure 4. Typical Transfer Characteristic

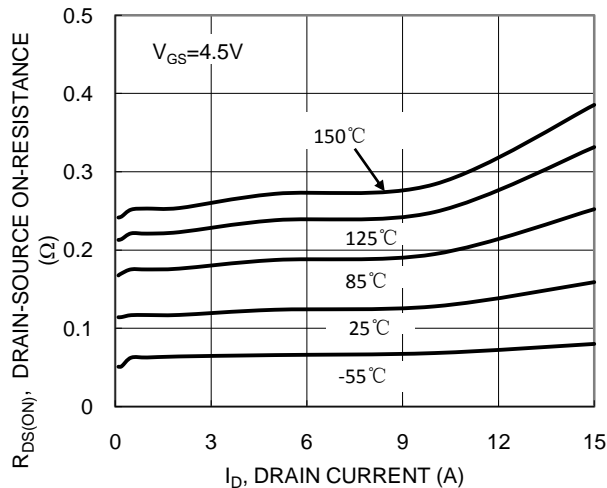


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

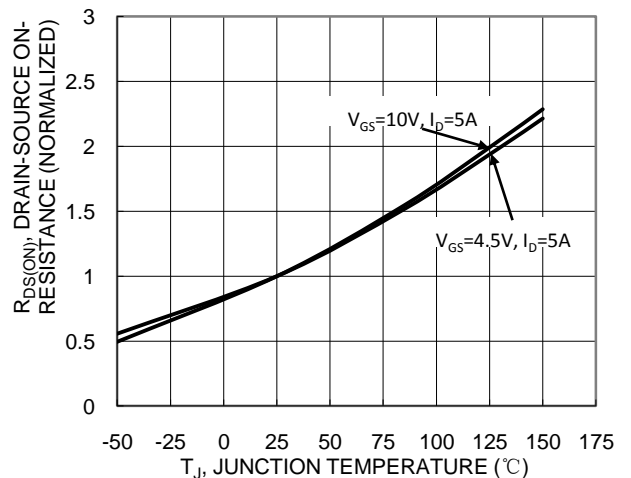


Figure 6. On-Resistance Variation with Temperature

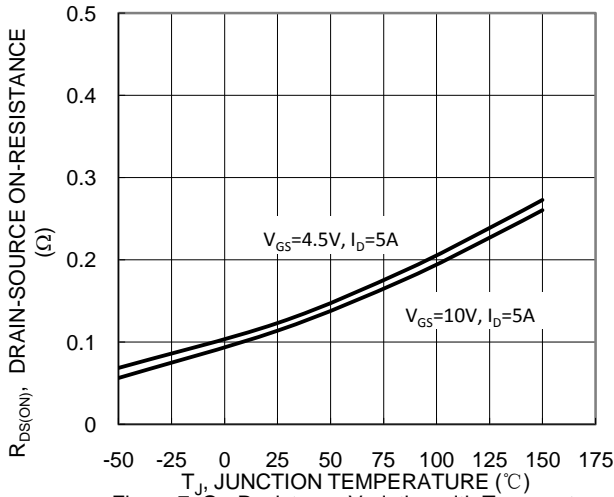


Figure 7. On-Resistance Variation with Temperature

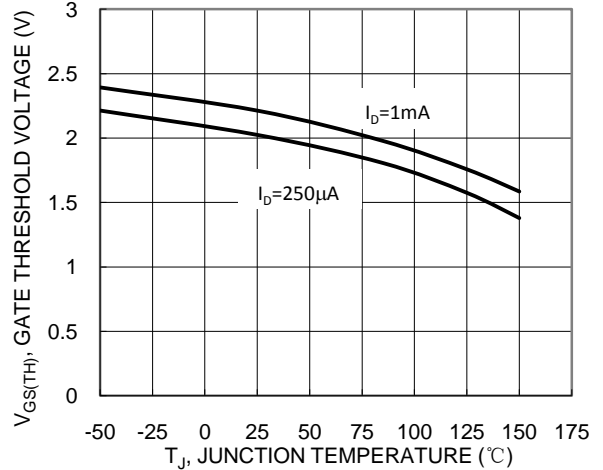


Figure 8. Gate Threshold Variation vs. Junction Temperature

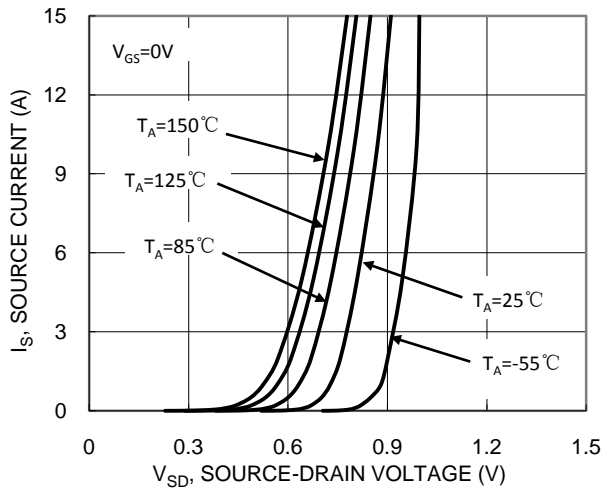


Figure 9. Diode Forward Voltage vs. Current

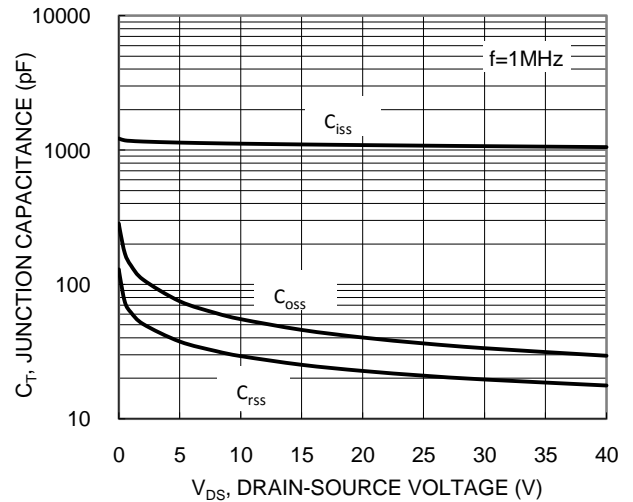


Figure 10. Typical Junction Capacitance

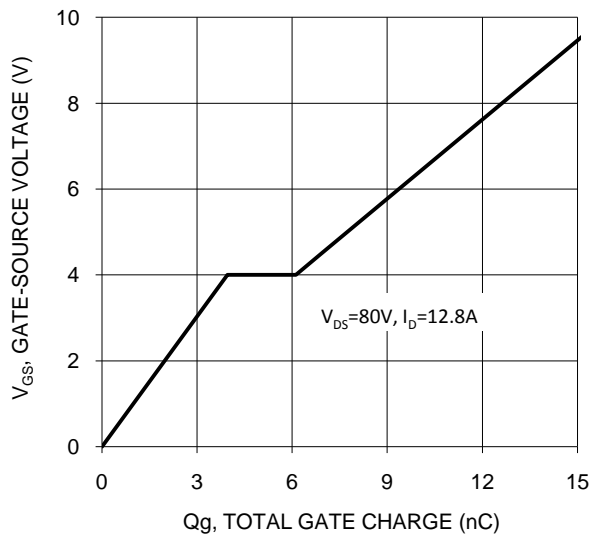


Figure 11. Gate Charge

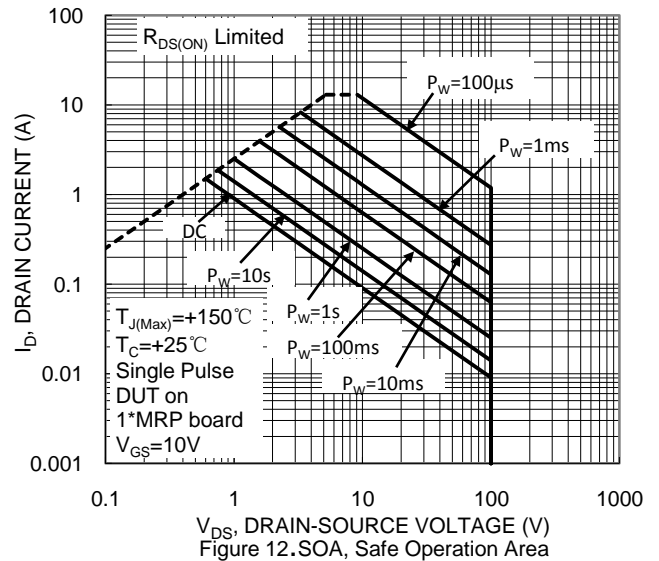


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

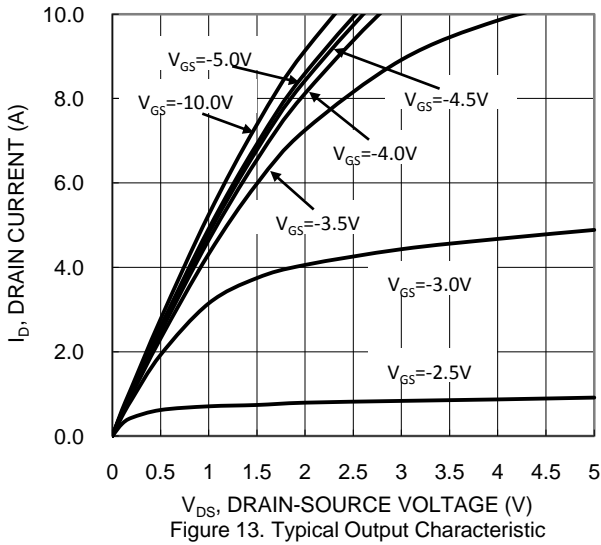


Figure 13. Typical Output Characteristic

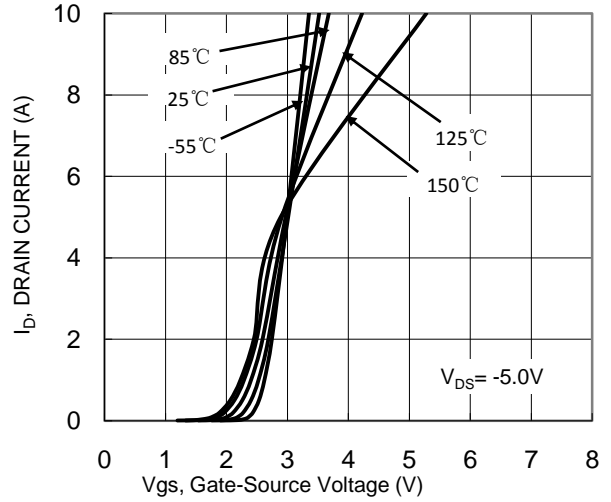


Fig.14 Typical Transfer Characteristic

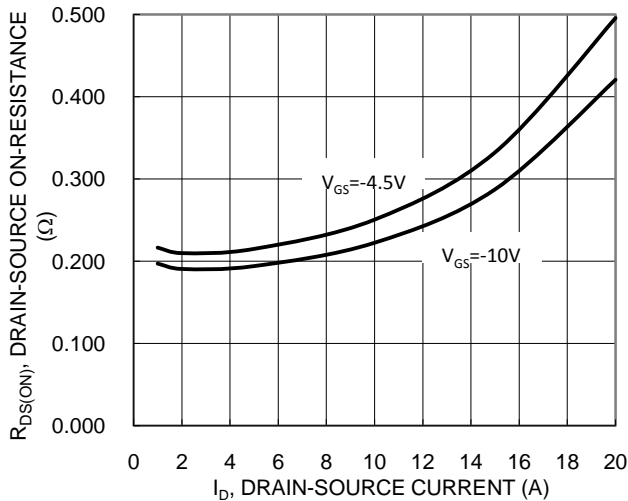


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

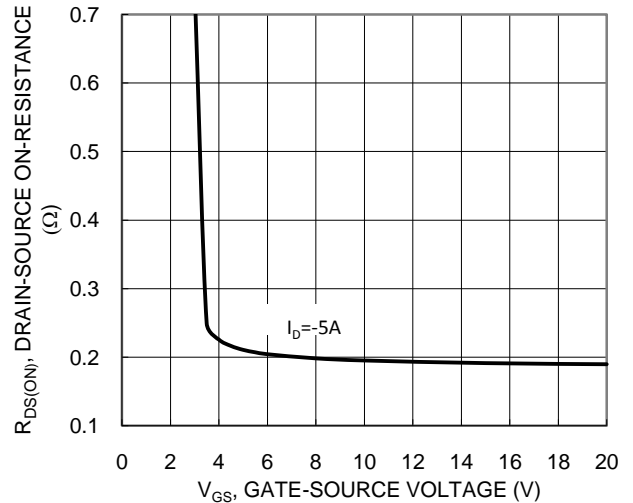


Figure 16. Typical Transfer Characteristic

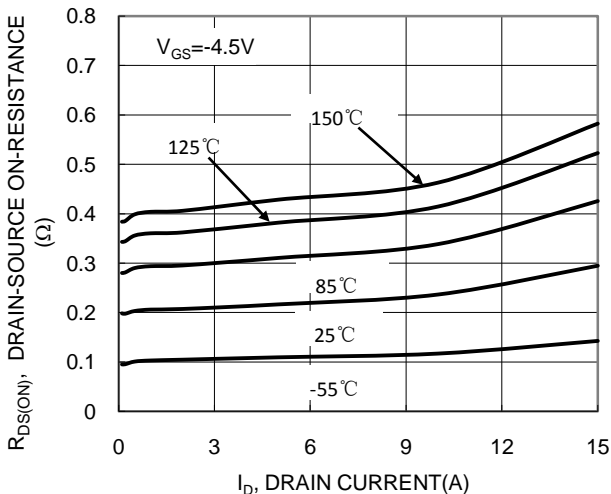


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

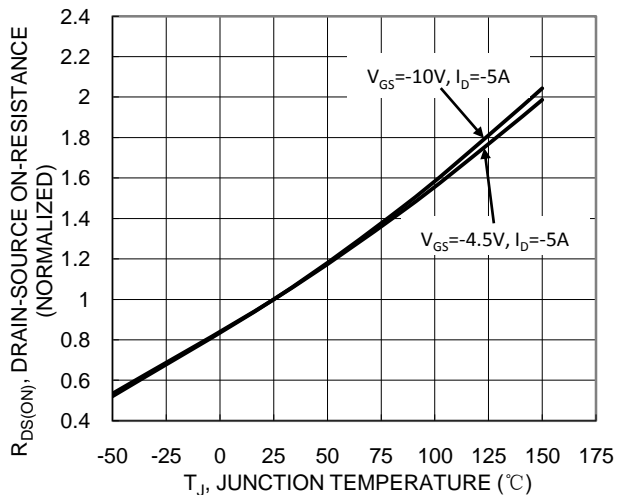


Figure 18. On-Resistance Variation with Temperature

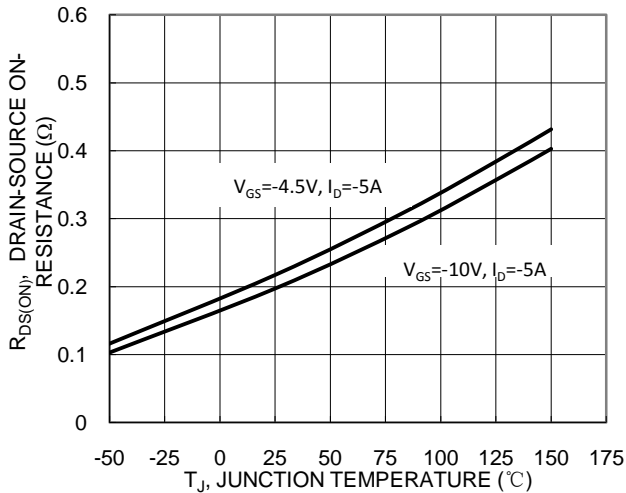


Figure 19. On-Resistance Variation with Temperature

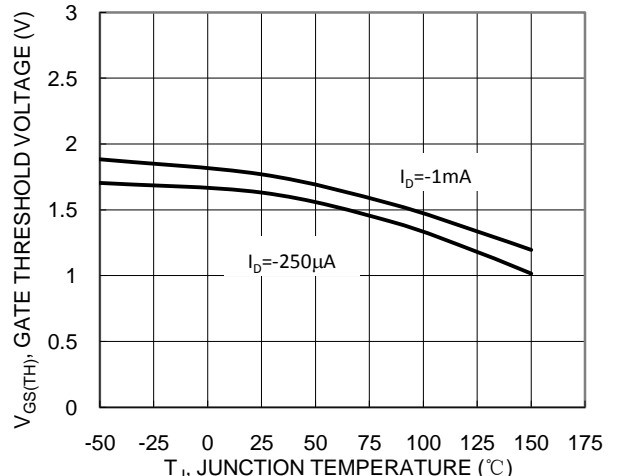


Figure 20. Gate Threshold Variation vs. Junction Temperature

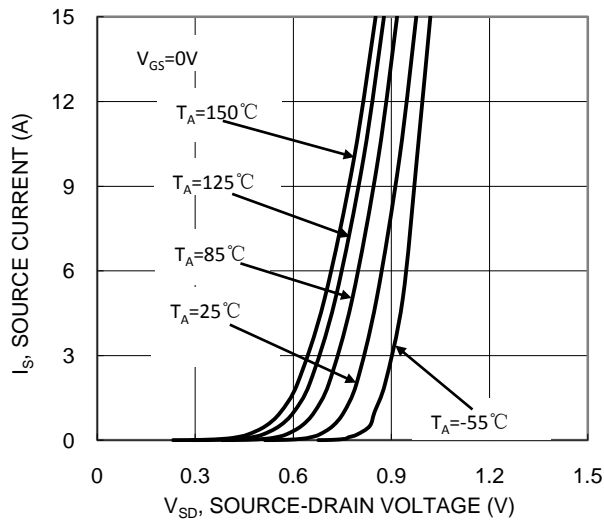


Figure 21. Diode Forward Voltage vs. Current

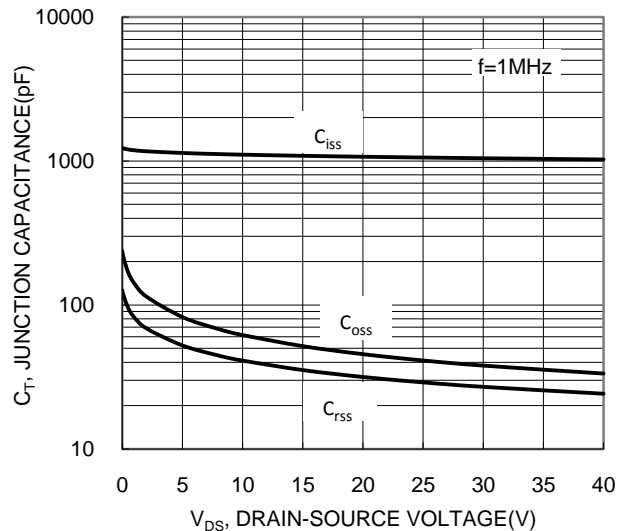


Figure 22. Typical Junction Capacitance

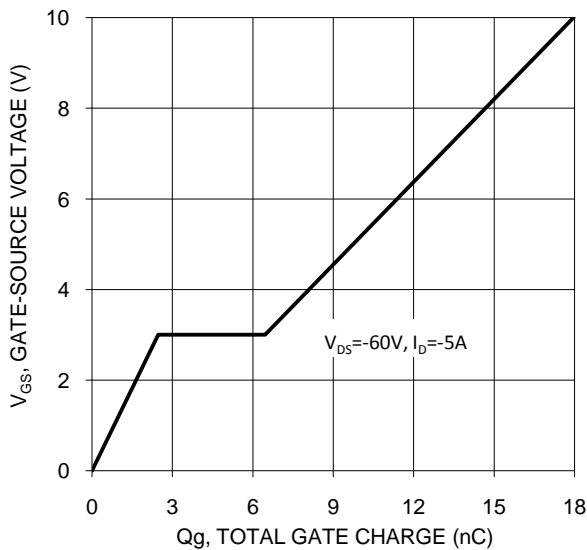


Figure 23. Gate Charge

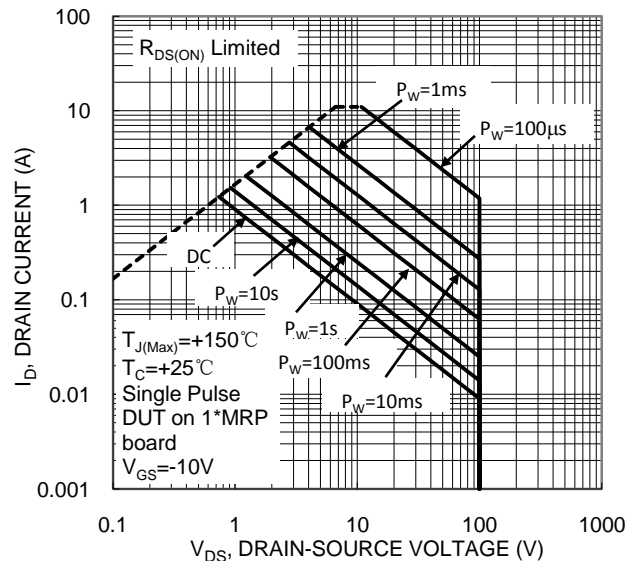
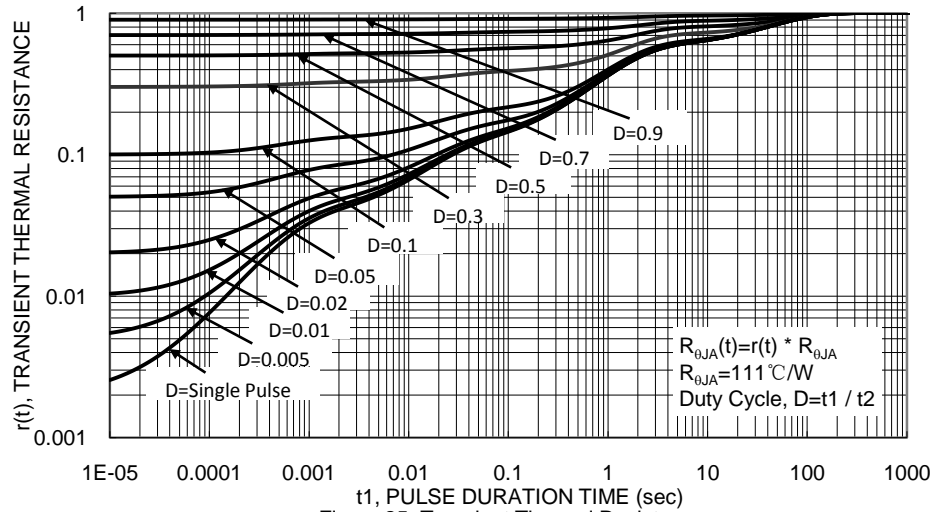


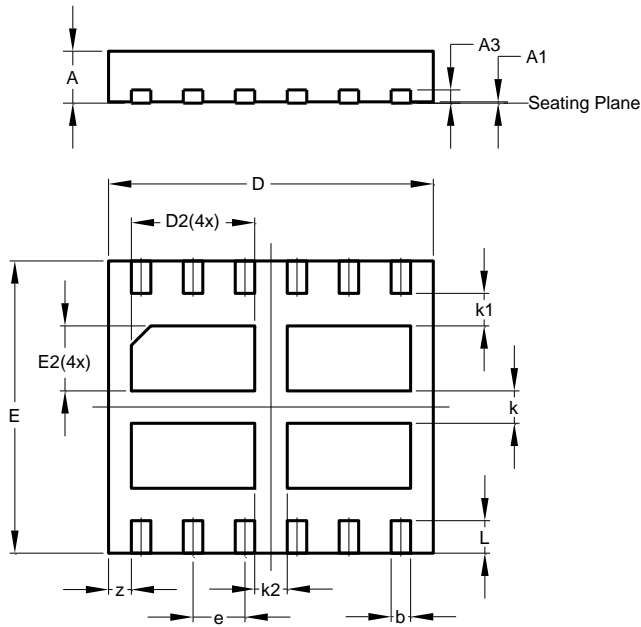
Figure 24. SOA, Safe Operation Area



Package Outline Dimensions

Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.

V-DFN5045-12

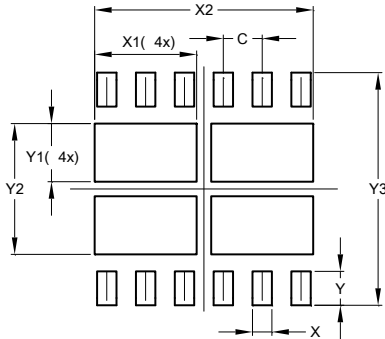


| V-DFN5045-12 | | | |
|-----------------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0.00 | 0.05 | 0.02 |
| A3 | - | - | 0.203 |
| b | 0.25 | 0.35 | 0.30 |
| D | 4.95 | 5.05 | 5.00 |
| D2 | 1.80 | 2.00 | 1.90 |
| E | 4.45 | 4.55 | 4.50 |
| E2 | 0.90 | 1.10 | 1.00 |
| e | - | - | 0.80 |
| k | - | - | 0.50 |
| k1 | - | - | 0.50 |
| k2 | - | - | 0.50 |
| L | 0.45 | 0.55 | 0.50 |
| z | - | - | 0.35 |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/_files/datasheets/ap02001.pdf for the latest version.

V-DFN5045-12



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.800 |
| X | 0.400 |
| X1 | 2.100 |
| X2 | 4.500 |
| Y | 0.700 |
| Y1 | 1.200 |
| Y2 | 2.700 |
| Y3 | 4.800 |

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