

## Product Summary

Device	BV <sub>DSS</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> T <sub>A</sub> = +25°C
Q1 & Q4	100V	160mΩ @ V <sub>GS</sub> = 10V	2.9A
		200mΩ @ V <sub>GS</sub> = 4.5V	2.6A
Q2 & Q3	-100V	250mΩ @ V <sub>GS</sub> = -10V	-2.3A
		300mΩ @ V <sub>GS</sub> = -4.5V	-2.1A

## Description and Applications

This new generation MOSFET is designed to minimize the on-state resistance (R<sub>DS(ON)</sub>) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

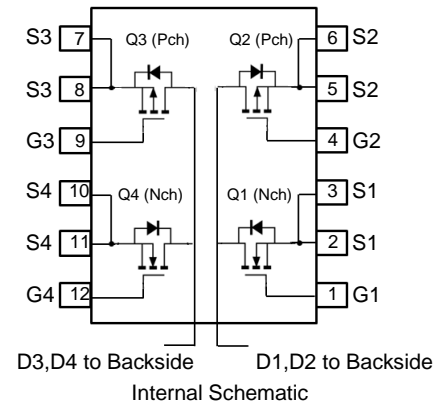
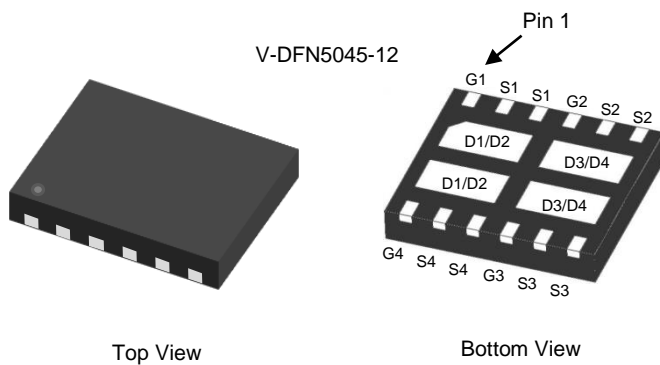
- High-efficiency bridge rectifiers

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact@diodes.com) or your local Diodes representative.**  
<https://www.diodes.com/quality/product-definitions/>

## Mechanical Data

- Package: V-DFN5045-12
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(4)</sup>
- Weight: 0.056 grams (Approximate)

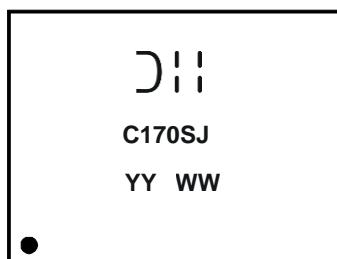


## Ordering Information (Note 4)

Part Number	Package	Tape Width	Packing	
			Qty.	Carrier
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) & 2015/863/EU (RoHS 3) compliant.
  - See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



DII = Manufacturer's Marking  
 C170SJ = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 22 = 2022)  
 WW = Week Code (01 to 53)

**Maximum Ratings Q1 & Q4 N-Channel** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	100	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 5) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	2.9 2.3	A
Maximum Body Diode Forward Current (Note 5)			$I_S$	2.5	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	13	A

**Maximum Ratings Q2 & Q3 P-Channel** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	-100	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 5) $V_{GS} = -10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	-2.3 -1.9	A
Maximum Body Diode Forward Current (Note 5)			$I_S$	-2.3	A
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	-11	A

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	2.1	W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	60	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	6	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 80V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	1.0	2.0	3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	111	160	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5A
		—	121	200		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A
Diode Forward Voltage	V <sub>SD</sub>	—	0.9	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 10A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	1,167	—	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	36	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	25	—		
Gate Resistance	R <sub>G</sub>	—	1.3	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = 4.5V)	Q <sub>g</sub>	—	4.9	—	nC	V <sub>DS</sub> = 80V, I <sub>D</sub> = 12.8A
Total Gate Charge (V <sub>GS</sub> = 10V)	Q <sub>g</sub>	—	9.7	—		
Gate-Source Charge	Q <sub>gs</sub>	—	2.0	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	2.0	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	10.5	—	ns	V <sub>DD</sub> = 50V, R <sub>G</sub> = 25Ω, I <sub>D</sub> = 12.8A
Turn-On Rise Time	t <sub>R</sub>	—	11.1	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	42.6	—		
Turn-Off Fall Time	t <sub>F</sub>	—	12.8	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	30.3	—	ns	V <sub>GS</sub> = 0V, I <sub>S</sub> = 12.8A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	35.2	—	nC	V <sub>GS</sub> = 0V, I <sub>S</sub> = 12.8A, dI/dt = 100A/μs

**Electrical Characteristics Q2 & Q3 P-Channel** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 6)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = -80V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 6)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-1.0	-1.6	-3.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	191	250	mΩ	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A
		—	213	300		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A
Diode Forward Voltage	V <sub>SD</sub>	—	-0.9	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -5A
<b>DYNAMIC CHARACTERISTICS (Note 7)</b>						
Input Capacitance	C <sub>iss</sub>	—	1,239	—	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	42	—		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	28	—		
Gate Resistance	R <sub>G</sub>	—	13	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz
Total Gate Charge (V <sub>GS</sub> = -4.5V)	Q <sub>g</sub>	—	8.4	—	nC	V <sub>DS</sub> = -60V, I <sub>D</sub> = -5A
Total Gate Charge (V <sub>GS</sub> = -10V)	Q <sub>g</sub>	—	17.5	—		
Gate-Source Charge	Q <sub>gs</sub>	—	2.8	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	3.2	—		
Turn-On Delay Time	t <sub>D(ON)</sub>	—	9.1	—	ns	V <sub>DD</sub> = -50V, R <sub>G</sub> = 9.1Ω, I <sub>D</sub> = -5A
Turn-On Rise Time	t <sub>R</sub>	—	14.9	—		
Turn-Off Delay Time	t <sub>D(OFF)</sub>	—	57.4	—		
Turn-Off Fall Time	t <sub>F</sub>	—	34.4	—		
Body Diode Reverse Recovery Time	t <sub>RR</sub>	—	25.2	—	ns	V <sub>GS</sub> = 0V, I <sub>S</sub> = -5A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	—	24.5	—	nC	V <sub>GS</sub> = 0V, I <sub>S</sub> = -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**

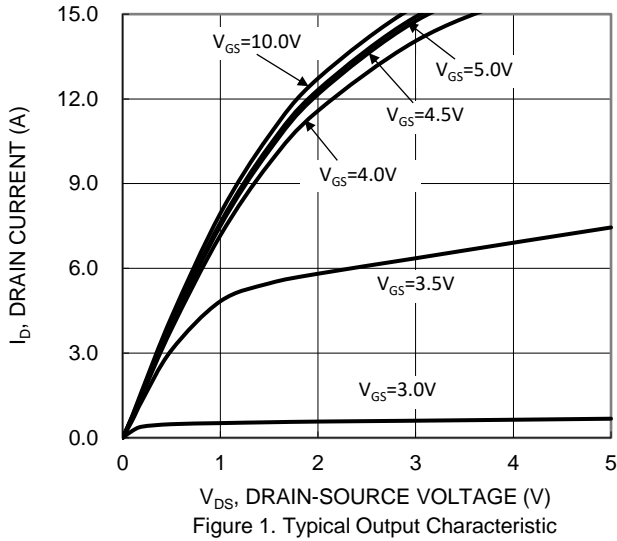


Figure 1. Typical Output Characteristic

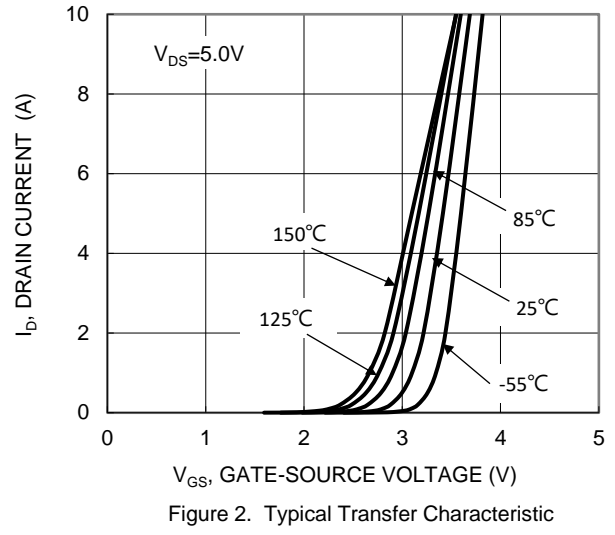


Figure 2. Typical Transfer Characteristic

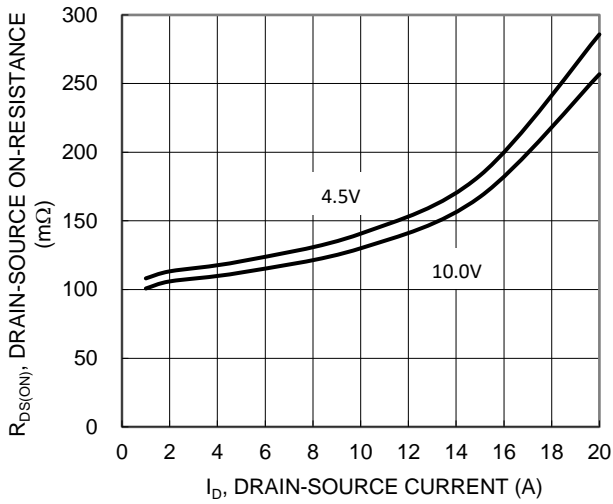


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

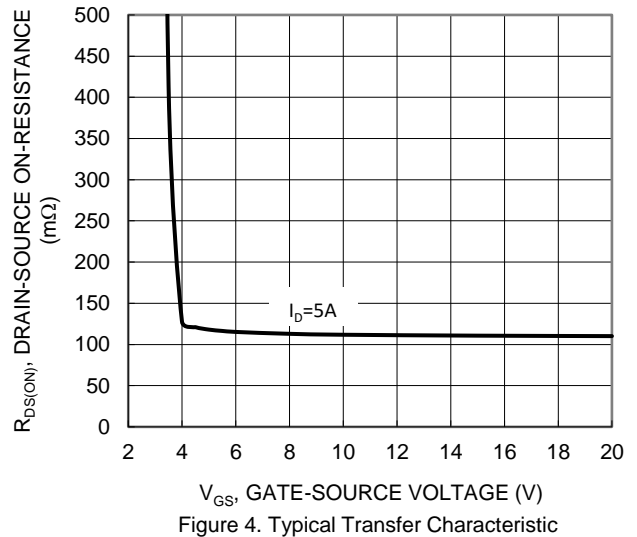


Figure 4. Typical Transfer Characteristic

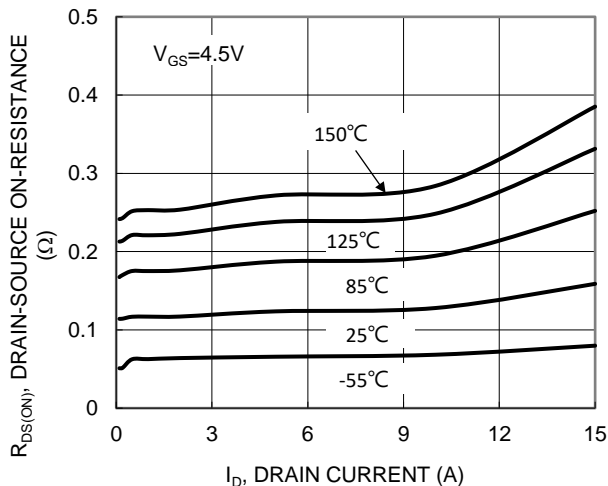


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

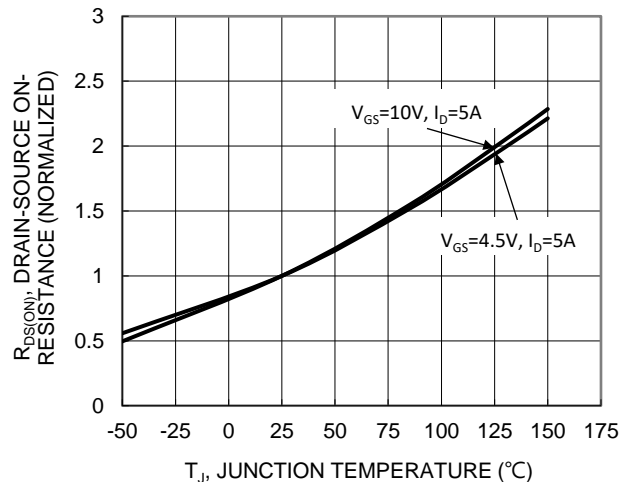
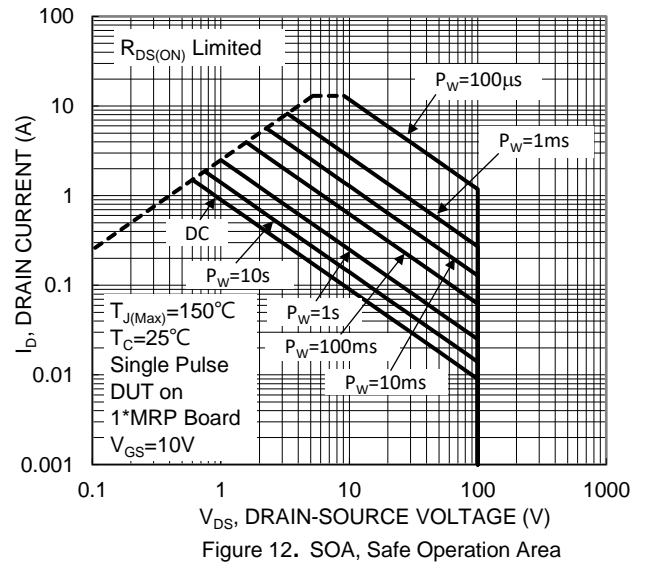
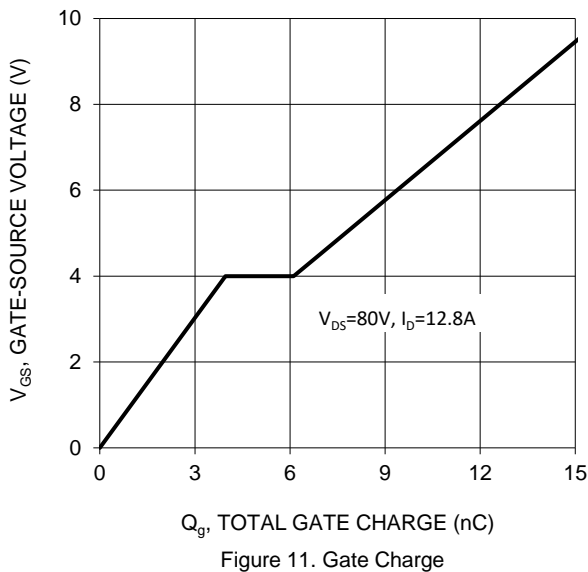
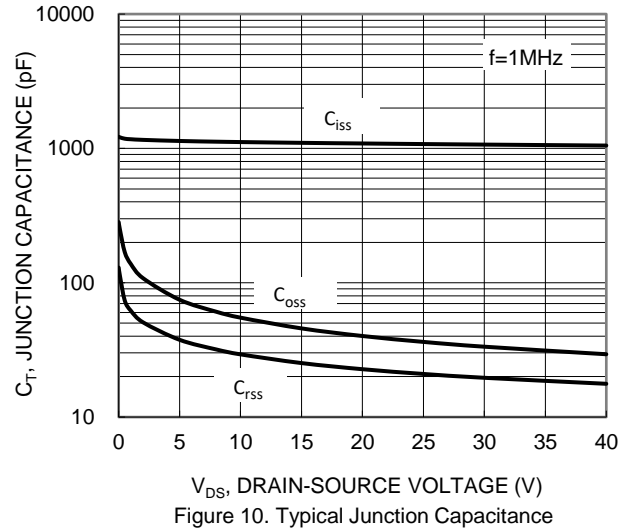
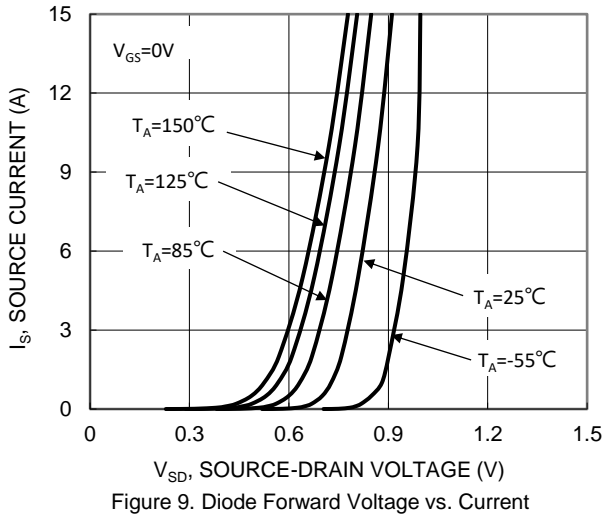
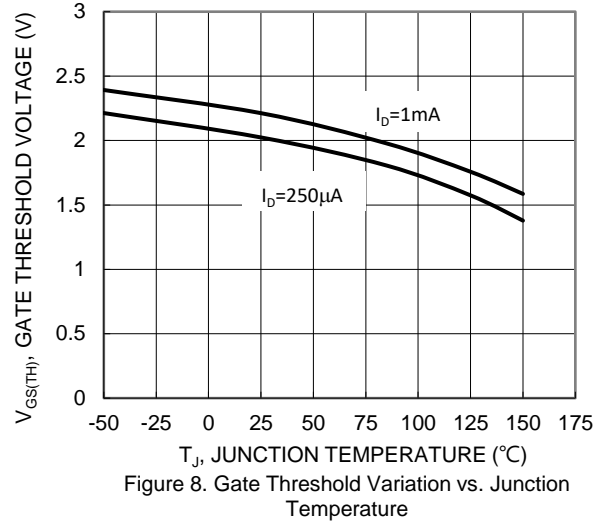
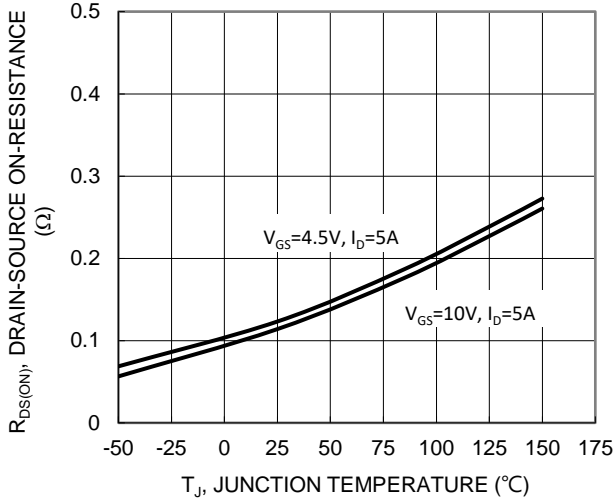


Figure 6. On-Resistance Variation with Temperature



**Typical Characteristics - P-CHANNEL**

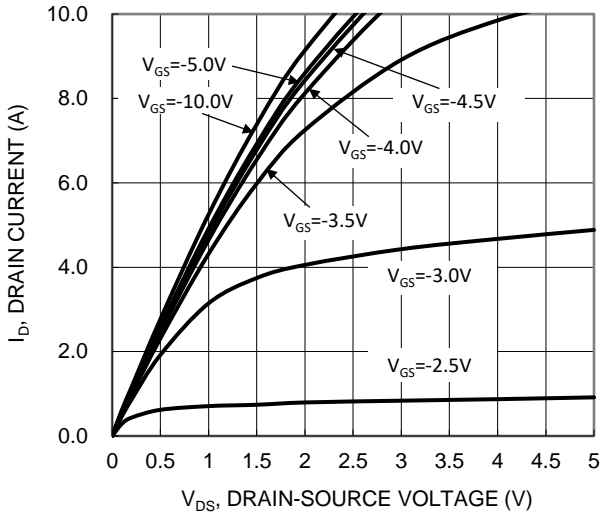


Figure 13. Typical Output Characteristic

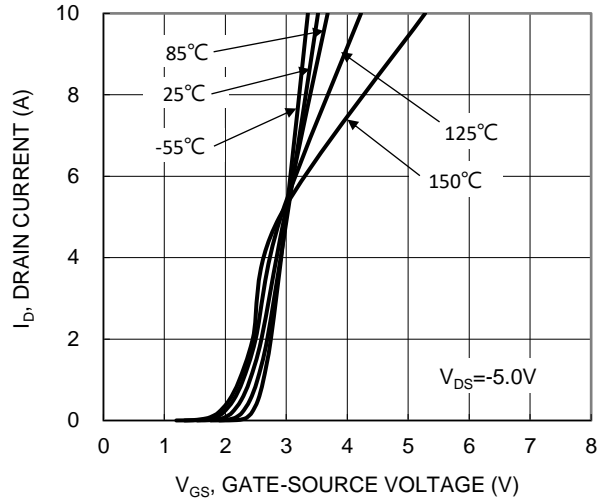


Figure 14. Typical Transfer Characteristic

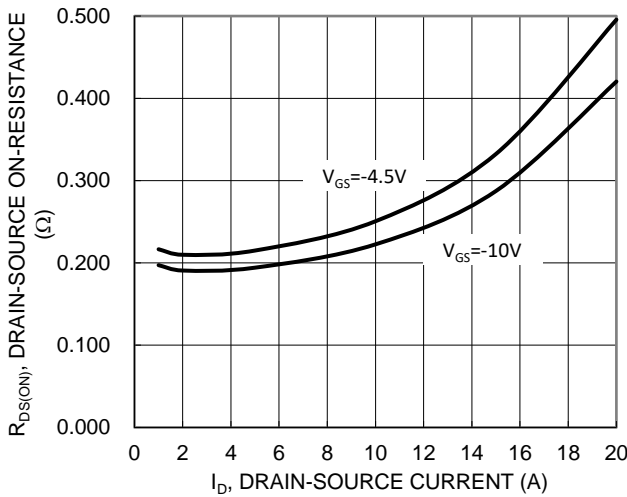


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

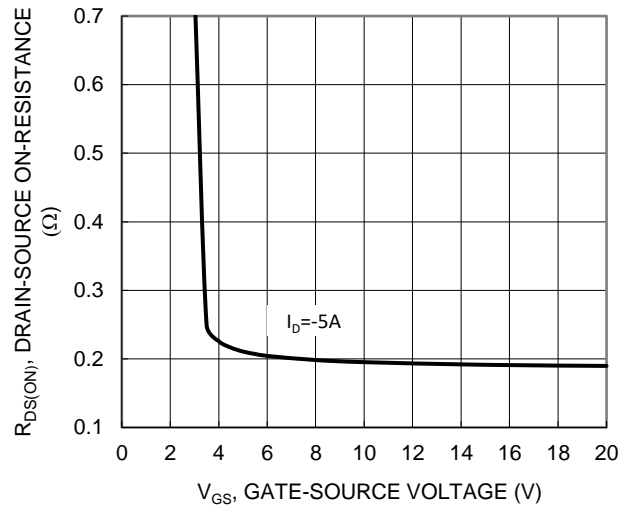


Figure 16. Typical Transfer Characteristic

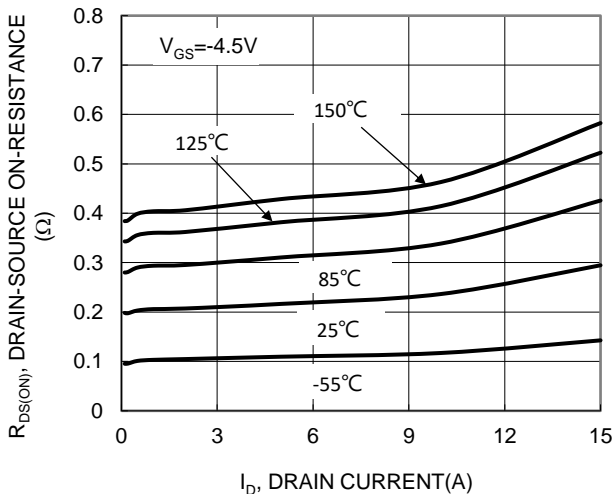


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

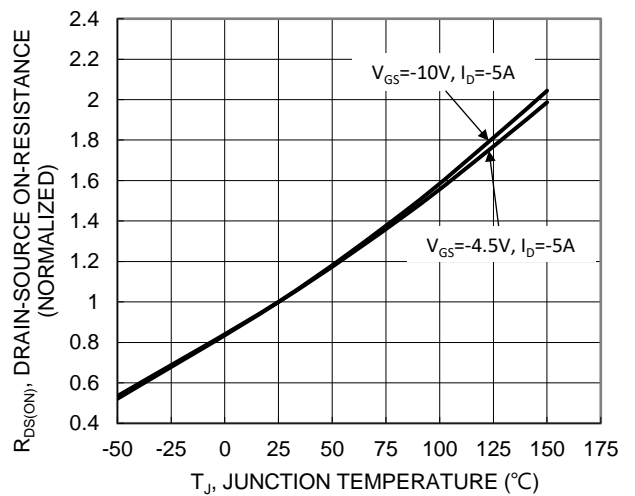


Figure 18. On-Resistance Variation with Temperature

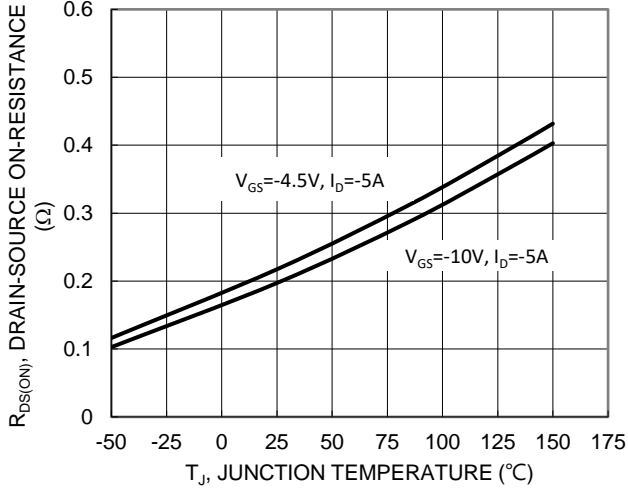


Figure 19. On-Resistance Variation with Temperature

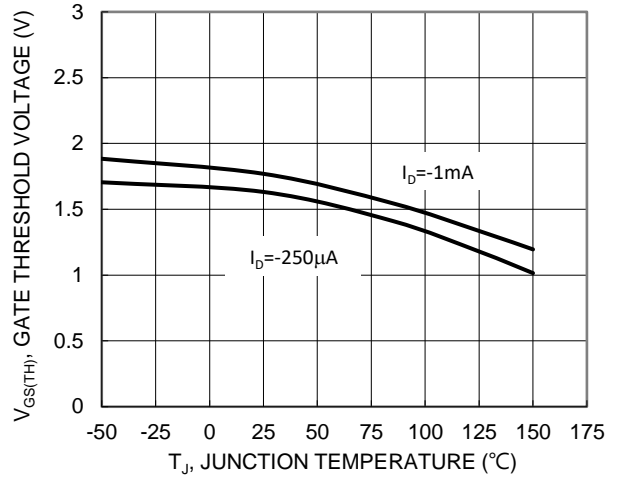


Figure 20. Gate Threshold Variation vs. Junction Temperature

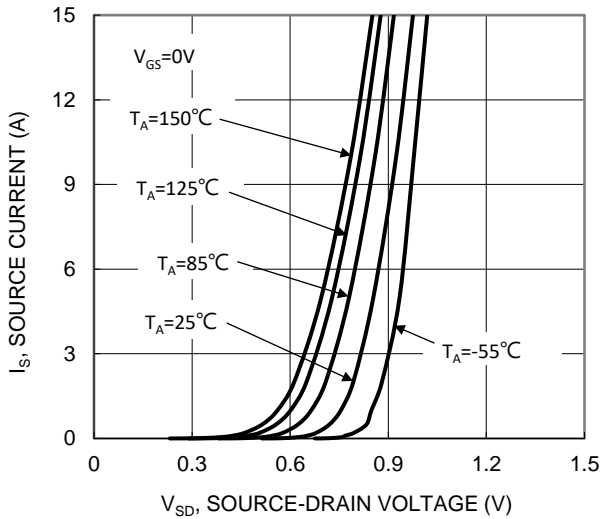


Figure 21. Diode Forward Voltage vs. Current

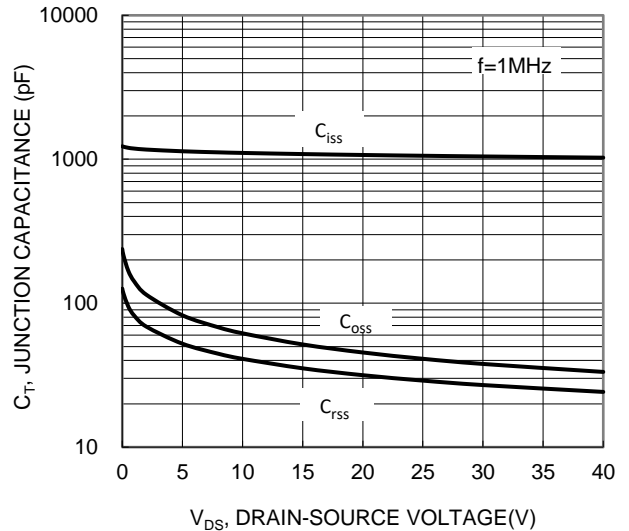


Figure 22. Typical Junction Capacitance

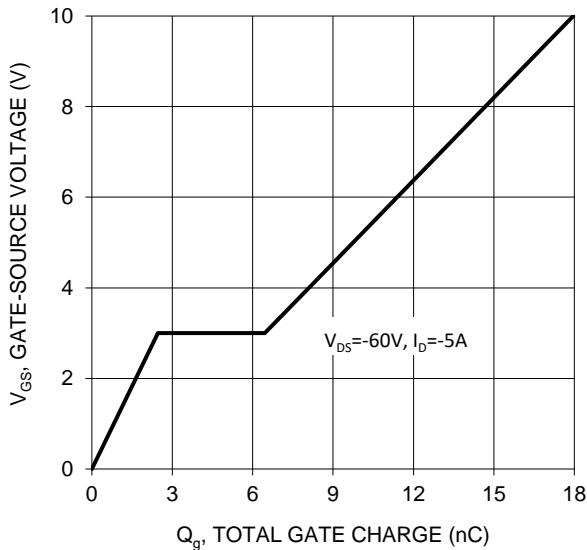


Figure 23. Gate Charge

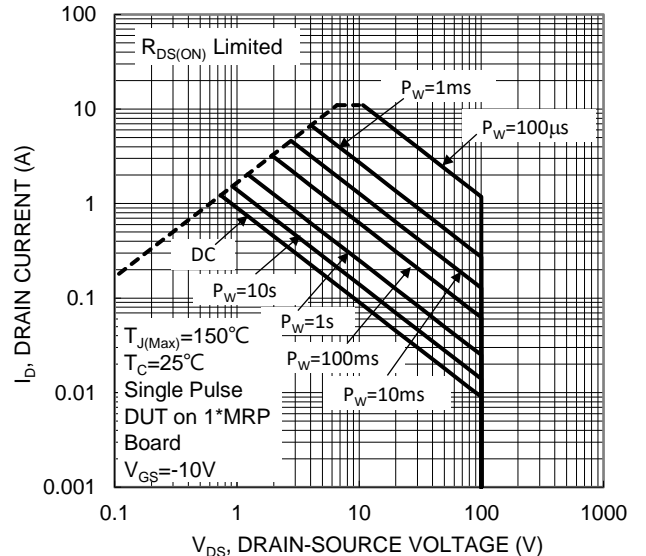


Figure 24. SOA, Safe Operation Area

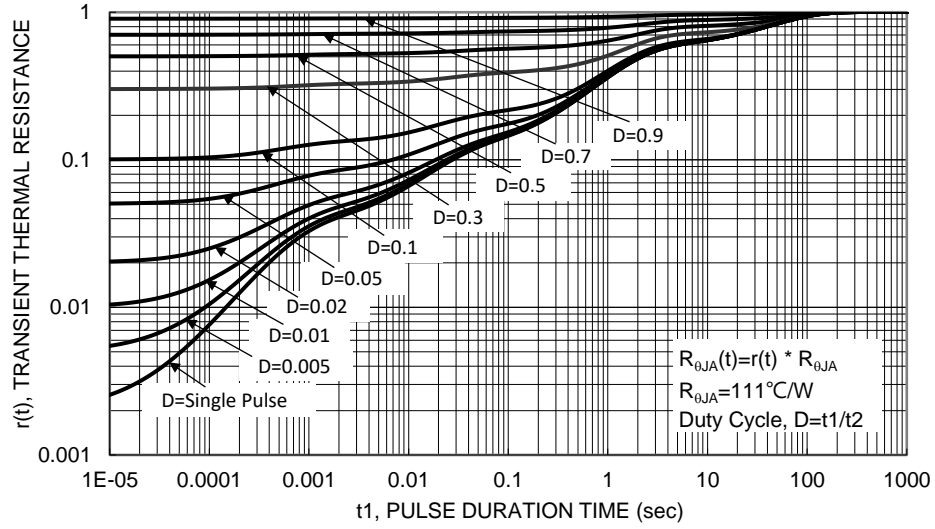


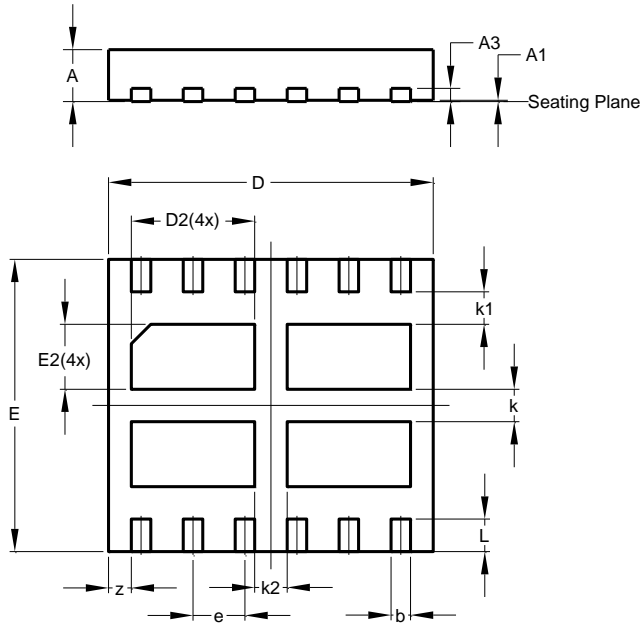
Figure 25. Transient Thermal Resistance



**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

V-DFN5045-12

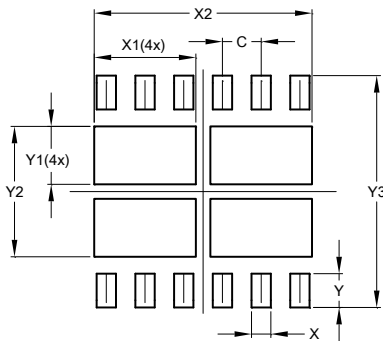


V-DFN5045-12			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.25	0.35	0.30
D	4.95	5.05	5.00
D2	1.80	2.00	1.90
E	4.45	4.55	4.50
E2	0.90	1.10	1.00
e	-	-	0.80
k	-	-	0.50
k1	-	-	0.50
k2	-	-	0.50
L	0.45	0.55	0.50
z	-	-	0.35
All Dimensions in mm			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> 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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