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Product Summary

Device	BV _{DS}	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

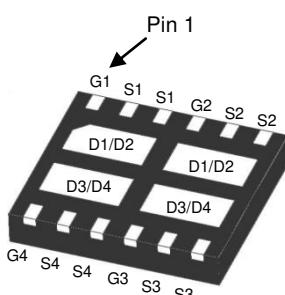
This new generation MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

Applications

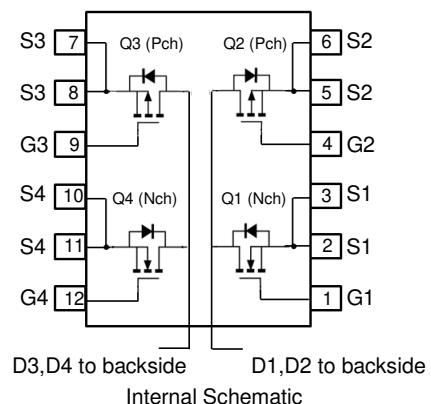
- High-Efficiency Bridge Rectifiers



Top View



Bottom View



Internal Schematic

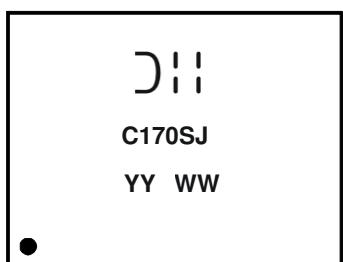
Ordering Information (Note 4)

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 (@ $T_A = +25^\circ\text{C}$, 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) $V_{GS} = 10\text{V}$	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 μs 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}	± 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	-2.4	A
Pulsed Drain Current (10 μs 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)	$T_A = +25^\circ\text{C}$	P_D	2.1	W
Thermal Resistance, Junction to Ambient (Note 5)		$R_{\theta JA}$	60	°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	°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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	100	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$\text{V}_{\text{DS}} = 80\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 20\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{TH})}$	1.0	2.0	3.0	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	111	160	$\text{m}\Omega$	$\text{V}_{\text{GS}} = 10\text{V}$, $\text{I}_D = 5\text{A}$
		—	121	200		$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{I}_D = 5\text{A}$
Diode Forward Voltage	V_{SD}	—	0.9	1.0	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 10\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	1,167	—	pF	$\text{V}_{\text{DS}} = 25\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	36	—		
Reverse Transfer Capacitance	C_{rss}	—	25	—		
Gate Resistance	R_{G}	—	1.3	—	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Total Gate Charge ($\text{V}_{\text{GS}} = 4.5\text{V}$)	Q_{g}	—	4.9	—	nC	$\text{V}_{\text{DS}} = 80\text{V}$, $\text{I}_D = 12.8\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = 10\text{V}$)	Q_{g}	—	9.7	—		
Gate-Source Charge	Q_{gs}	—	2.0	—		
Gate-Drain Charge	Q_{gd}	—	2.0	—		
Turn-On Delay Time	$\text{t}_{\text{D}(\text{ON})}$	—	10.5	—	ns	$\text{V}_{\text{DD}} = 50\text{V}$, $\text{R}_{\text{G}} = 25\Omega$, $\text{I}_D = 12.8\text{A}$
Turn-On Rise Time	t_{R}	—	11.1	—		
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{OFF})}$	—	42.6	—		
Turn-Off Fall Time	t_{F}	—	12.8	—		
Body Diode Reverse Recovery Time	t_{RR}	—	30.3	—	ns	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 12.8\text{A}$, $\text{di/dt} = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	35.2	—	nC	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 12.8\text{A}$, $\text{di/dt} = 100\text{A}/\mu\text{s}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	-100	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$\text{V}_{\text{DS}} = -80\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$\text{V}_{\text{GS}} = \pm 20\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{TH})}$	-1.0	-1.6	-3.0	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	191	250	$\text{m}\Omega$	$\text{V}_{\text{GS}} = -10\text{V}$, $\text{I}_D = -5\text{A}$
		—	213	300		$\text{V}_{\text{GS}} = -4.5\text{V}$, $\text{I}_D = -5\text{A}$
Diode Forward Voltage	V_{SD}	—	-0.9	-1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = -5\text{A}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	1,239	—	pF	$\text{V}_{\text{DS}} = -25\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	42	—		
Reverse Transfer Capacitance	C_{rss}	—	28	—		
Gate Resistance	R_{g}	—	13	—	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Total Gate Charge ($\text{V}_{\text{GS}} = -4.5\text{V}$)	Q_{g}	—	8.4	—	nC	$\text{V}_{\text{DS}} = -60\text{V}$, $\text{I}_D = -5\text{A}$
Total Gate Charge ($\text{V}_{\text{GS}} = -10\text{V}$)	Q_{g}	—	17.5	—		
Gate-Source Charge	Q_{gs}	—	2.8	—		
Gate-Drain Charge	Q_{gd}	—	3.2	—		
Turn-On Delay Time	$\text{t}_{\text{D}(\text{ON})}$	—	9.1	—	ns	$\text{V}_{\text{DD}} = -50\text{V}$, $\text{R}_{\text{g}} = 9.1\Omega$, $\text{I}_D = -5\text{A}$
Turn-On Rise Time	t_{R}	—	14.9	—		
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{OFF})}$	—	57.4	—		
Turn-Off Fall Time	t_{F}	—	34.4	—		
Body Diode Reverse Recovery Time	t_{RR}	—	25.2	—	ns	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = -5\text{A}$, $\text{di/dt} = 100\text{A}/\mu\text{s}$
Body Diode Reverse Recovery Charge	Q_{RR}	—	24.5	—	nC	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = -5\text{A}$, $\text{di/dt} = 100\text{A}/\mu\text{s}$

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

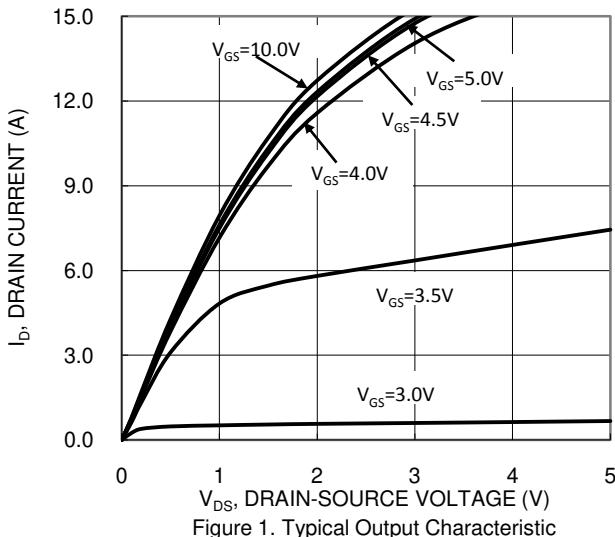


Figure 1. Typical Output Characteristic

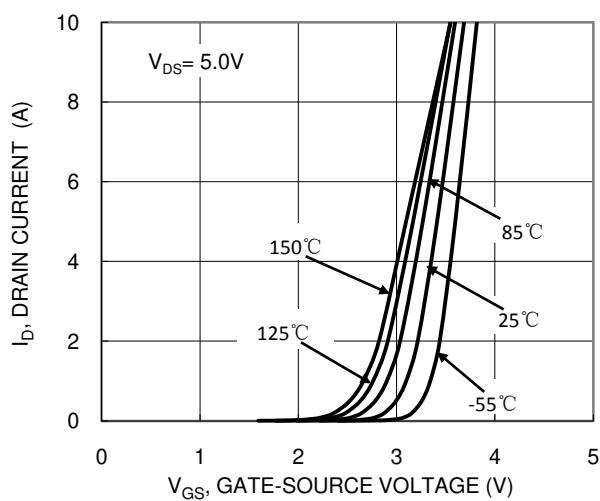


Figure 2. Typical Transfer Characteristic

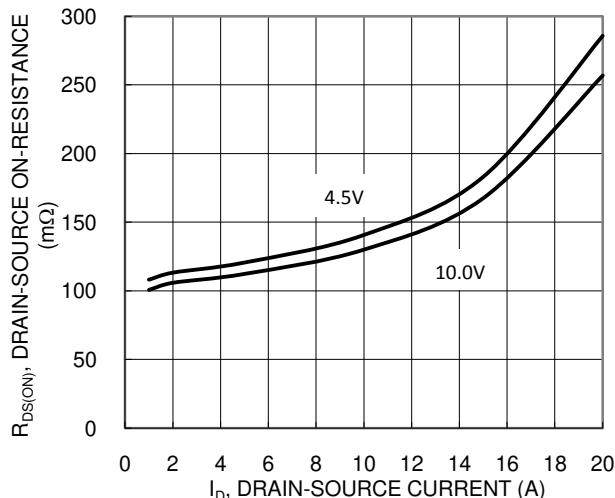


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

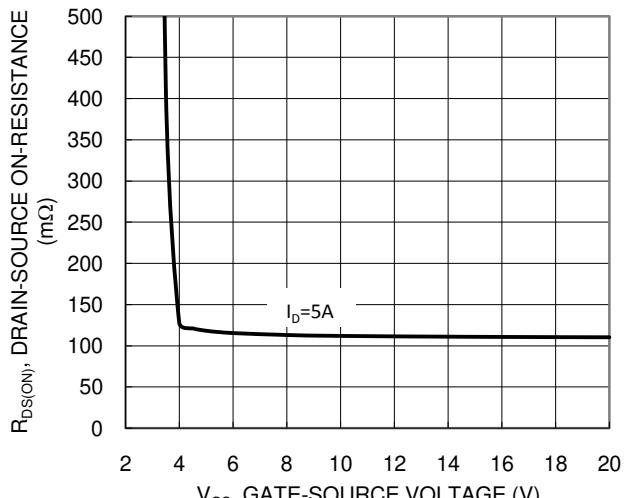


Figure 4. Typical Transfer Characteristic

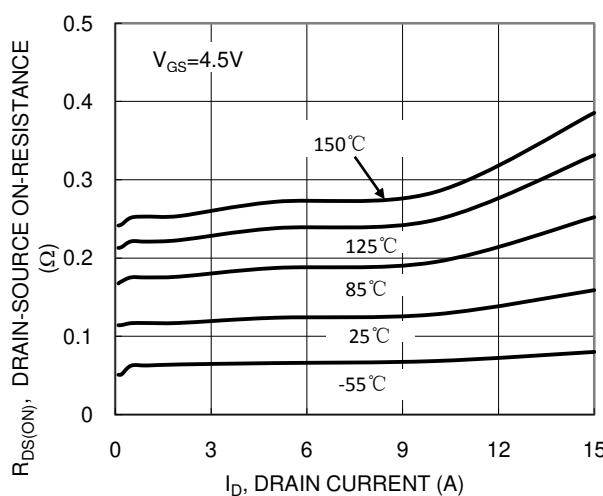


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

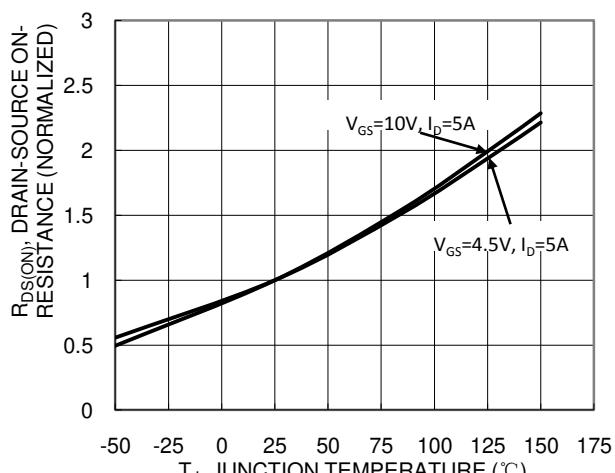
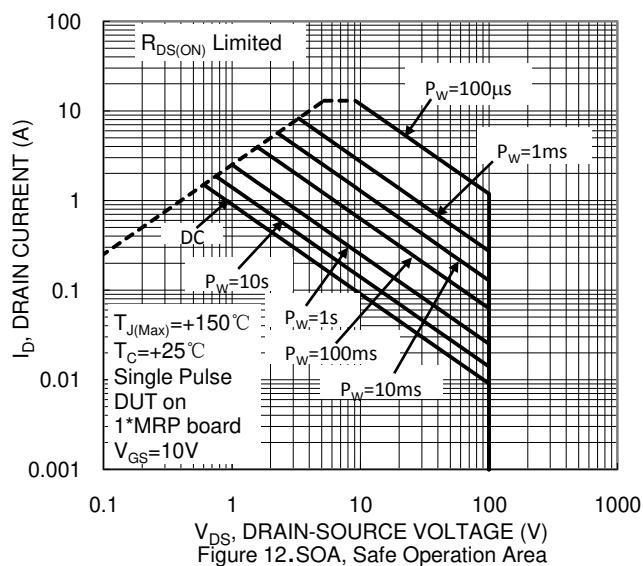
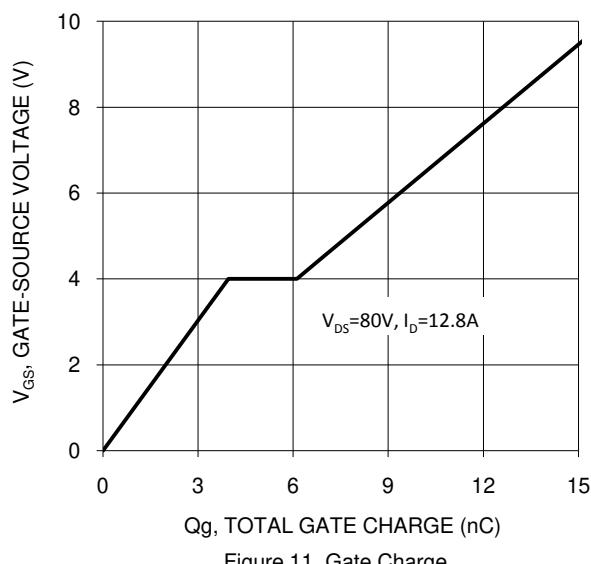
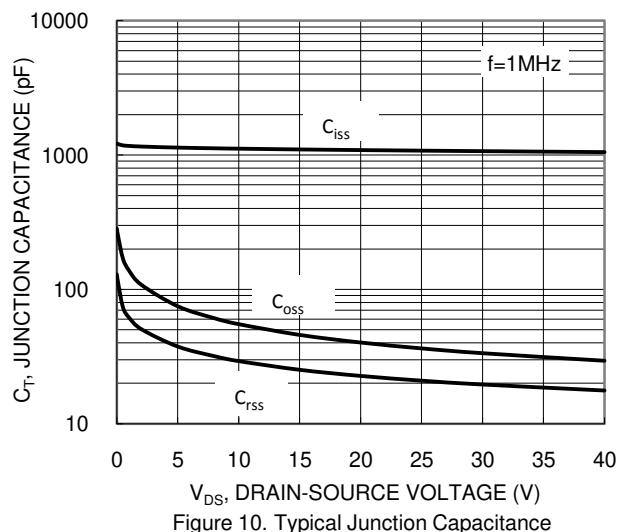
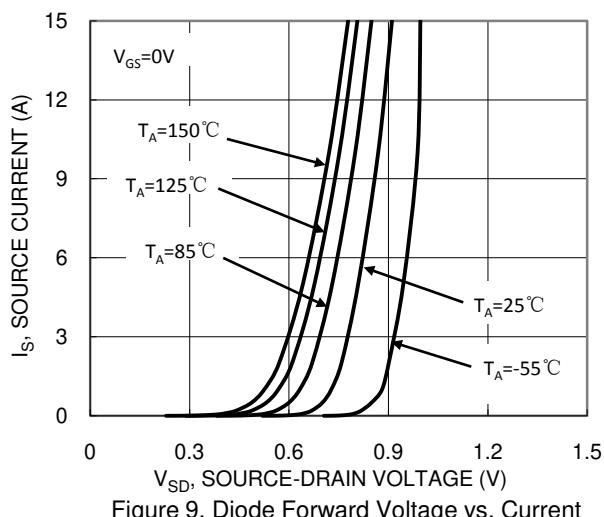
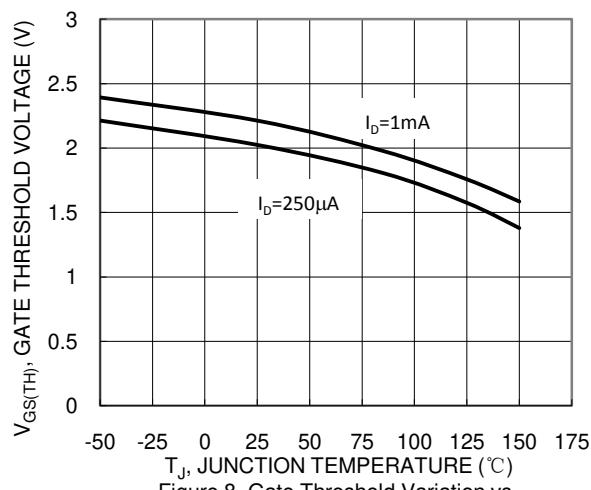
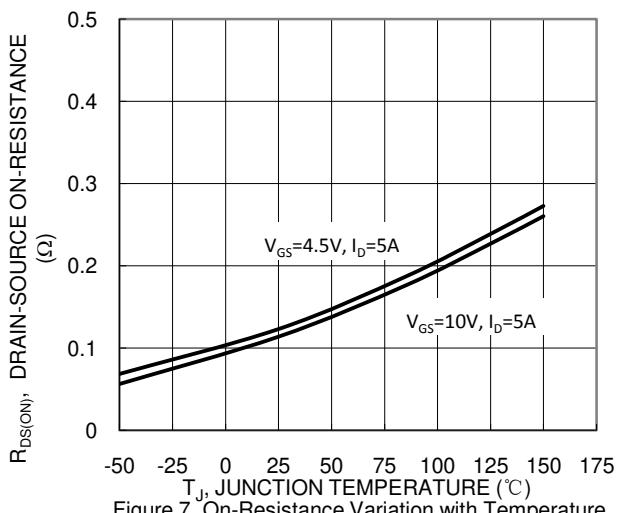


Figure 6. On-Resistance Variation with Temperature



Typical Characteristics - P-CHANNEL

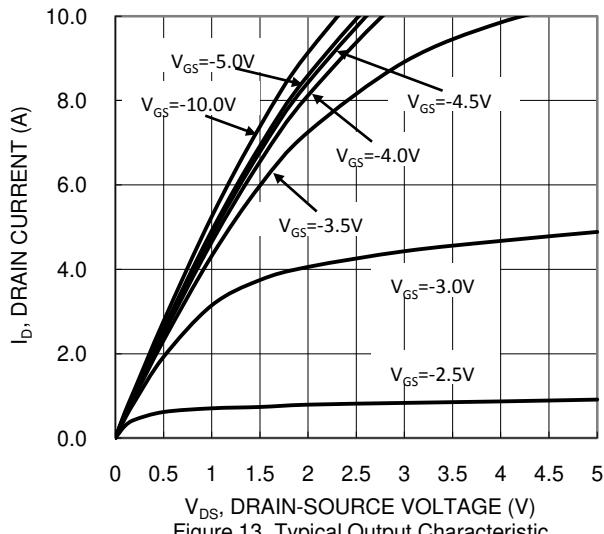


Figure 13. Typical Output Characteristic

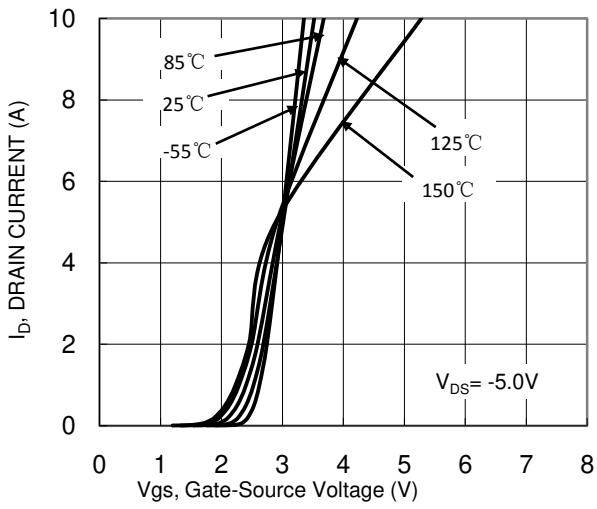


Figure 14. Typical Transfer Characteristic

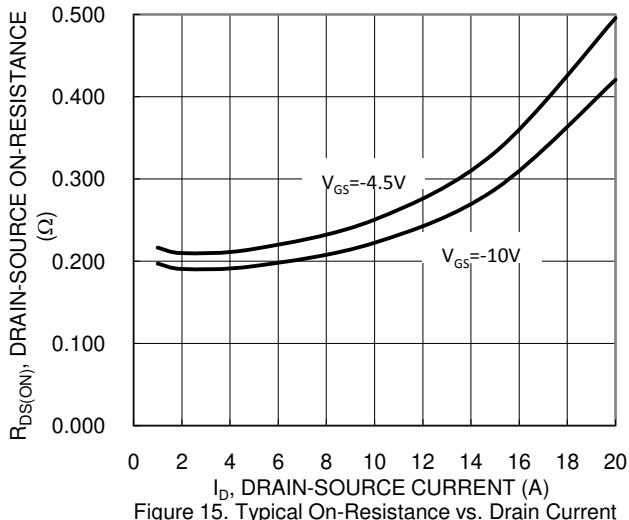


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

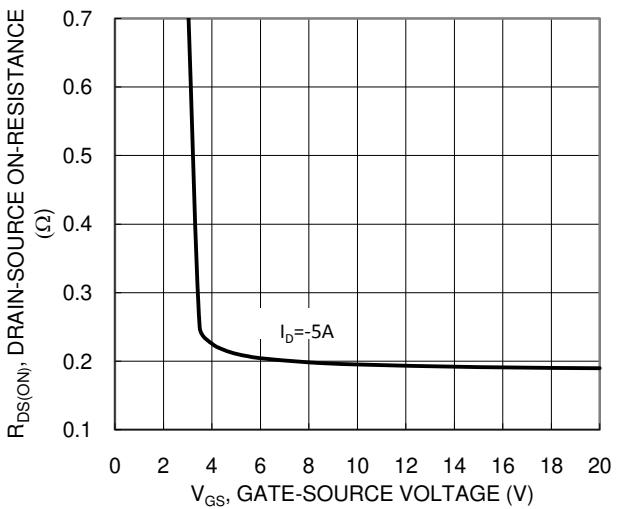


Figure 16. Typical Transfer Characteristic

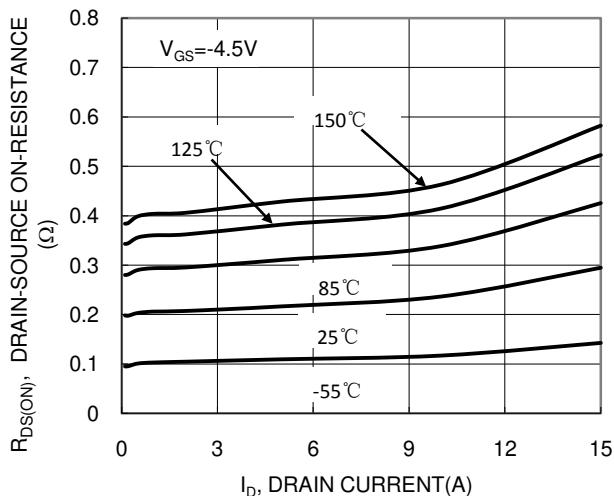


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

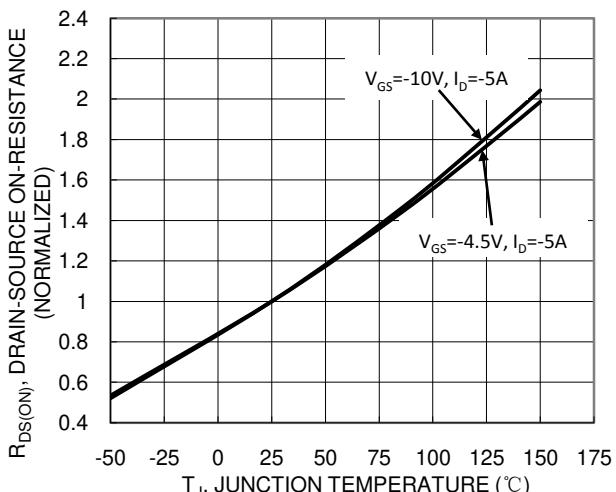
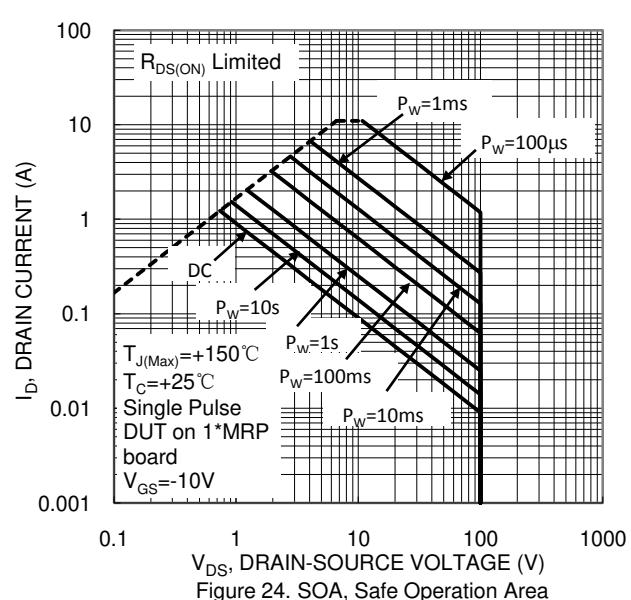
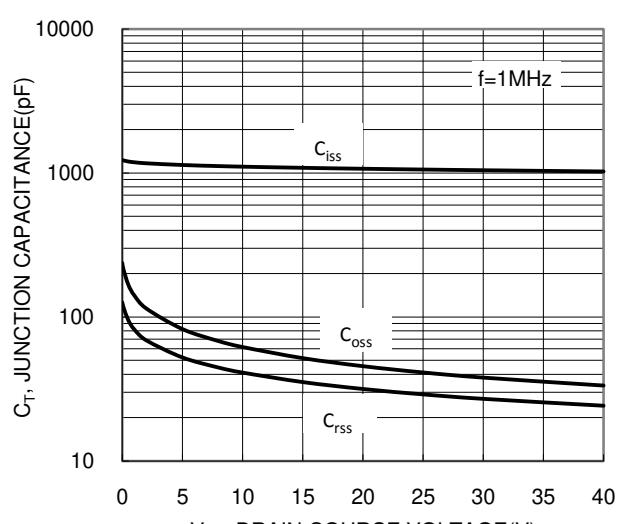
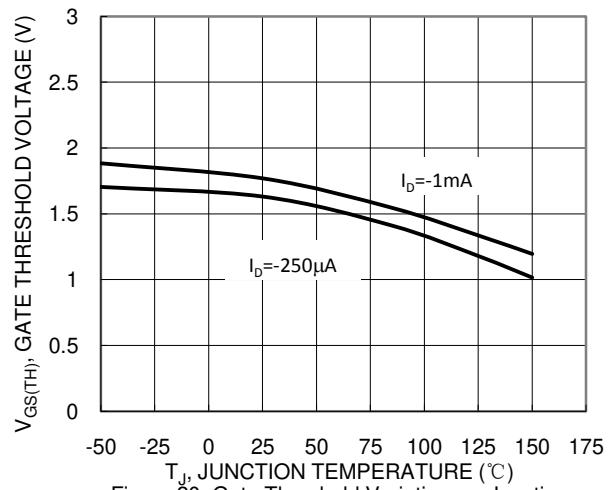
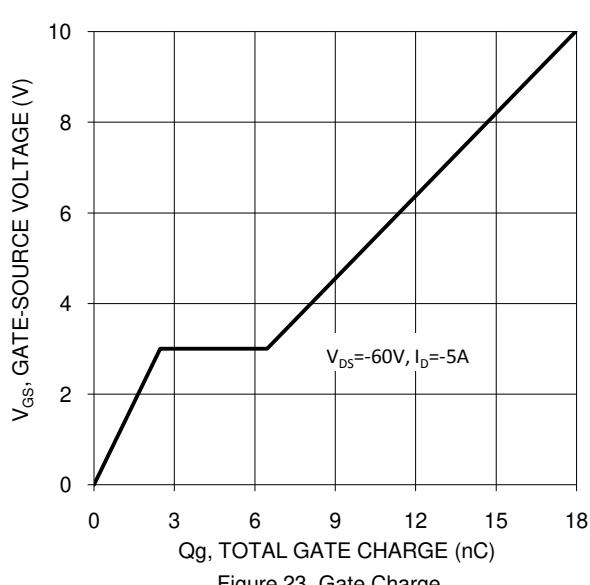
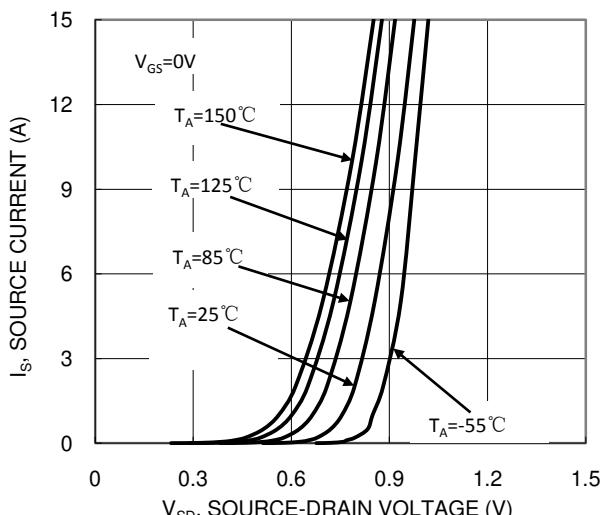
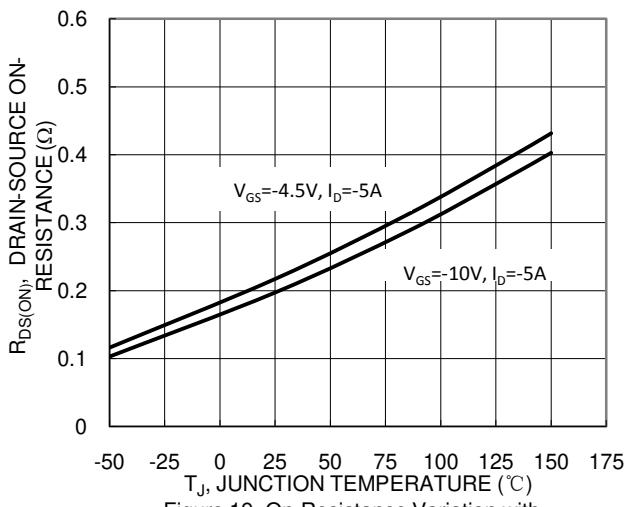
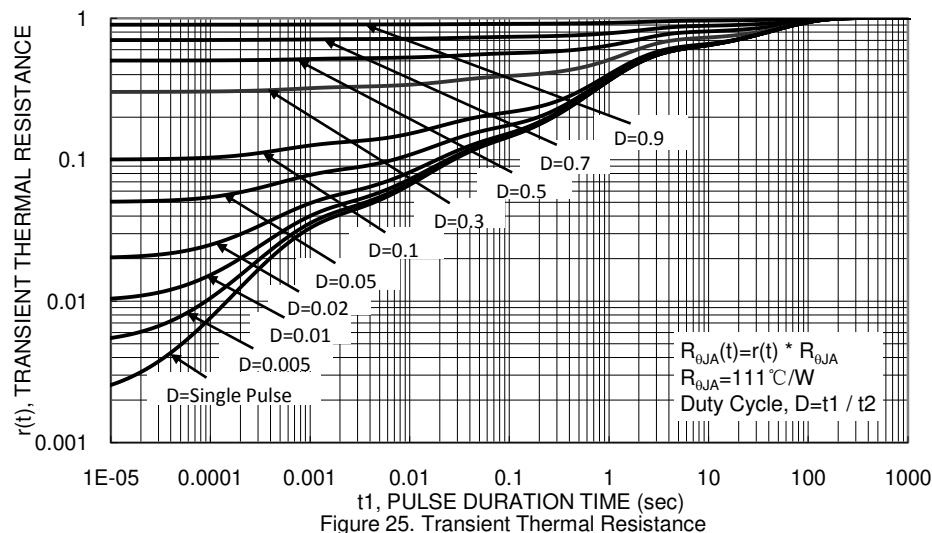


Figure 18. On-Resistance Variation with Temperature

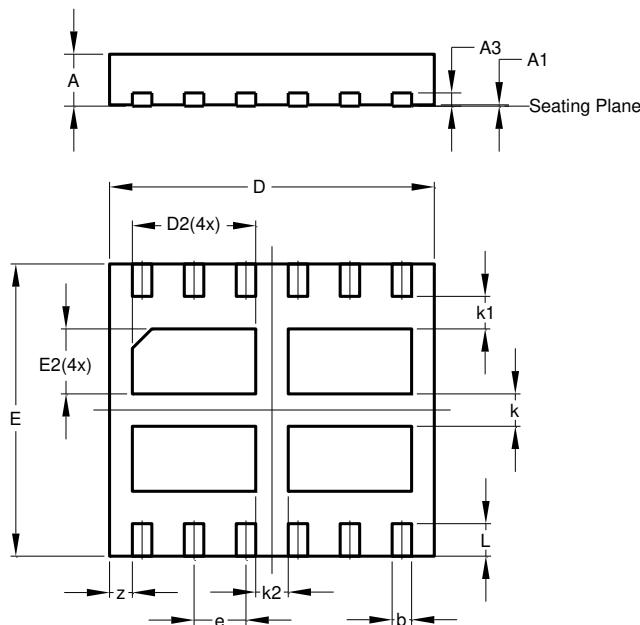




Package Outline Dimensions

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

V-DFN5045-12



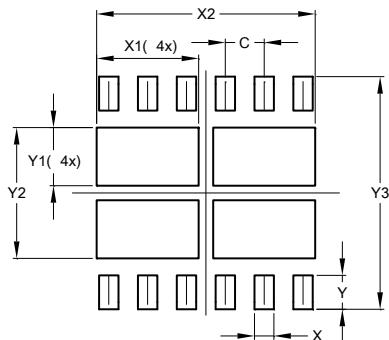
V-DFN5045-12			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	-	-	0.203
b	0.25	0.35	0.30
D	4.95	5.05	5.00
D2	1.80	2.00	1.90
E	4.45	4.55	4.50
E2	0.90	1.10	1.00
e	-	-	0.80
k	-	-	0.50
k1	-	-	0.50
k2	-	-	0.50
L	0.45	0.55	0.50
z	-	-	0.35

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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