

Product Summary

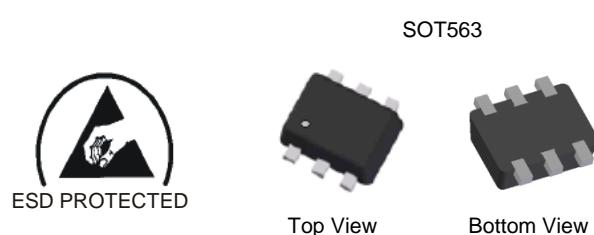
Device	$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_A = +25^\circ\text{C}$
Q1	20V	0.5Ω @ $V_{GS} = 4.5\text{V}$	1030mA
		0.9Ω @ $V_{GS} = 1.8\text{V}$	740mA
Q2	-20V	1.0Ω @ $V_{GS} = -4.5\text{V}$	-700mA
		2.0Ω @ $V_{GS} = -1.8\text{V}$	-460mA

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

- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Load Switch

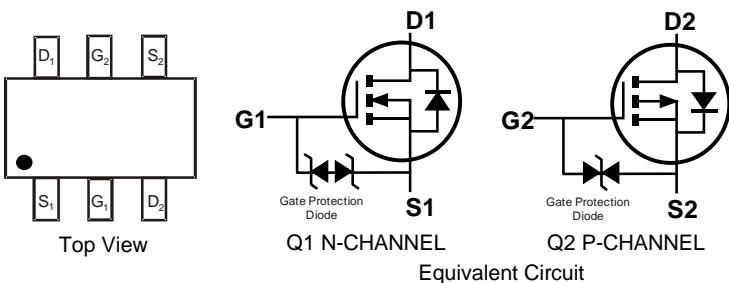


Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage $V_{GS(\text{th})} < 1\text{V}$
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- Ultra-Small Surface Mount Package
- ESD Protected Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

Mechanical Data

- Case: SOT563
- Case 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 – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⑧
- Weight: 0.003 grams (Approximate)



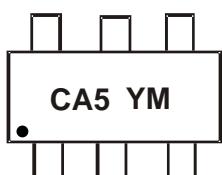
Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2450UV-7	SOT563	3,000/Tape & Reel
DMC2450UV-13	SOT563	10,000/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



CA5 = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: C = 2015)
 M = Month (ex: 9 = September)

Date Code Key

Year	2015	2016	2017	2018	2019	2020	2021					
Code	C	D	E	F	G	H	I					
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 - Q1 N-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Drain Current (Note 6) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	1,030 800	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	1,150 900	mA
Continuous Drain Current (Note 6) $V_{GS} = 1.8\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	740 570	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	870 700	mA
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)			I_{DM}	3	A
Maximum Body Diode Continuous Current			I_S	800	mA

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	± 12	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-700 -550	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-820 -640	mA
Continuous Drain Current (Note 6) $V_{GS} = -1.8\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-460 -350	mA
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	I_D	-550 -420	mA
Pulsed Drain Current (10 μs pulse, duty cycle = 1%)			I_{DM}	-2	A
Maximum Body Diode Continuous Current			I_S	-800	mA

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)		P_D	0.45	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	281	°C/W
	$t < 10\text{s}$		210	°C/W
Total Power Dissipation (Note 6)		P_D	1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	129	°C/W
	$t < 10\text{s}$		97	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

Electrical Characteristics - Q1 N-CHANNEL (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 1\text{mA}$
Zero Gate Voltage Drain Current $T_A = +25^\circ\text{C}$	I_{DSS}	—	—	100	nA	$\text{V}_{\text{DS}} = 20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 1.0	μA	$\text{V}_{\text{GS}} = \pm 5\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
		—	—	± 10.0		$\text{V}_{\text{GS}} = \pm 8\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
		—	—	—		—
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$\text{V}_{\text{GS}(\text{th})}$	0.5	—	0.9	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}(\text{ON})}$	—	0.3	0.48	Ω	$\text{V}_{\text{GS}} = 5.0\text{V}$, $\text{I}_D = 200\text{mA}$
		—	0.35	0.5		$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{I}_D = 200\text{mA}$
		—	0.45	0.7		$\text{V}_{\text{GS}} = 2.5\text{V}$, $\text{I}_D = 200\text{mA}$
		—	0.55	0.9		$\text{V}_{\text{GS}} = 1.8\text{V}$, $\text{I}_D = 100\text{mA}$
		—	0.65	1.5		$\text{V}_{\text{GS}} = 1.5\text{V}$, $\text{I}_D = 50\text{mA}$
		—	2	—		$\text{V}_{\text{GS}} = 1.2\text{V}$, $\text{I}_D = 1\text{mA}$
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 500\text{mA}$
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	37.1	—	pF	$\text{V}_{\text{DS}} = 10\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	6.5	—		
Reverse Transfer Capacitance	C_{rss}	—	4.8	—		
Gate Resistance	R_g	—	68	—	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Total Gate Charge	Q_g	—	0.5	—	nC	$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{V}_{\text{DS}} = 10\text{V}$, $\text{I}_D = 250\text{mA}$
Gate-Source Charge	Q_{gs}	—	0.07	—		
Gate-Drain Charge	Q_{gd}	—	0.1	—		
Turn-On Delay Time	$\text{t}_{\text{D}(\text{on})}$	—	4.06	—	ns	$\text{V}_{\text{DD}} = 10\text{V}$, $\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{R}_L = 47\Omega$, $\text{R}_G = 10\Omega$, $\text{I}_D = 200\text{mA}$
Turn-On Rise Time	t_r	—	7.28	—		
Turn-Off Delay Time	$\text{t}_{\text{D}(\text{off})}$	—	13.74	—		
Turn-Off Fall Time	t_f	—	10.54	—		

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

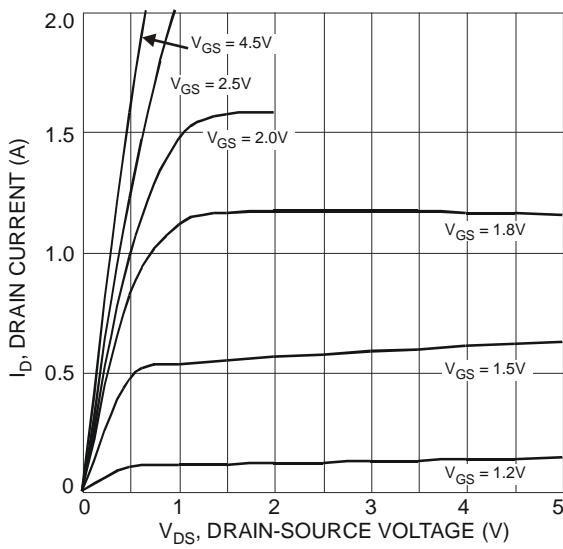


Fig. 1 Typical Output Characteristics

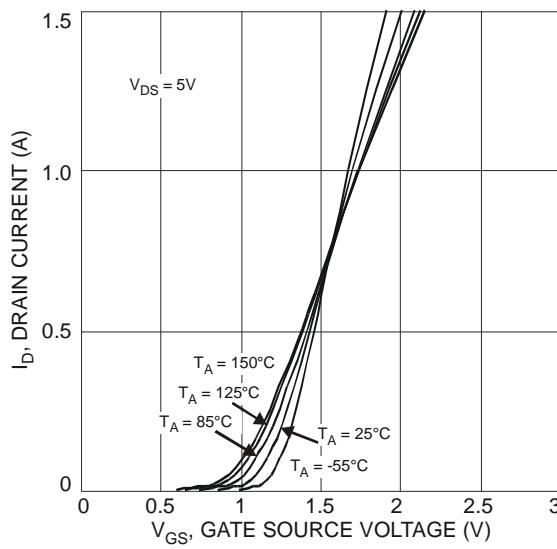


Fig. 2 Typical Transfer Characteristics

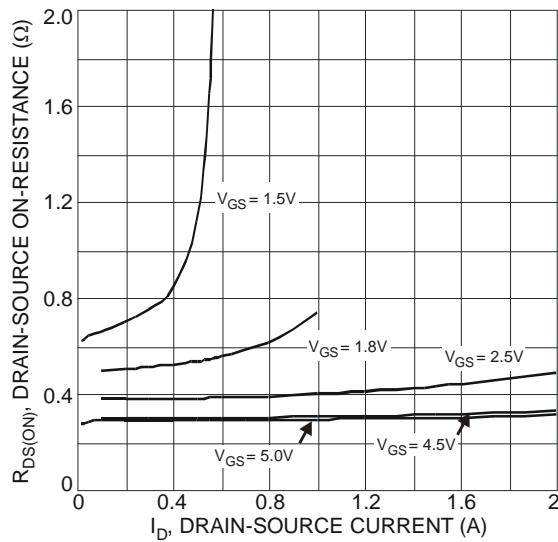


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

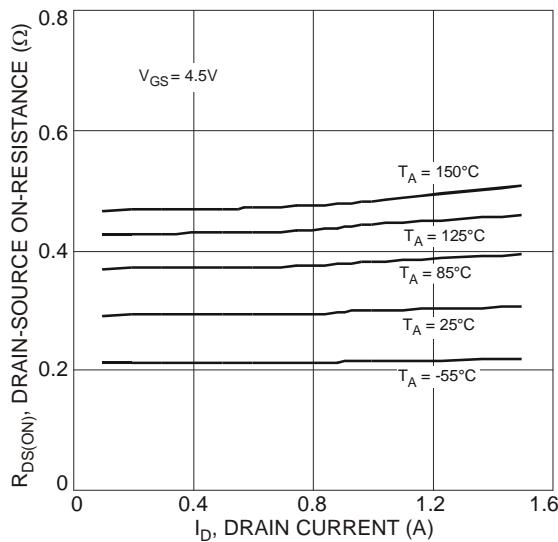


Fig. 4 Typical Drain-Source On-Resistance
vs. Drain Current and Temperature

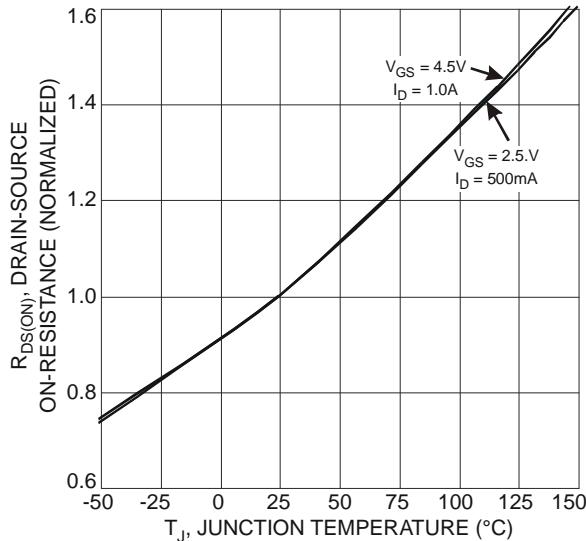


Fig. 5 On-Resistance Variation with Temperature

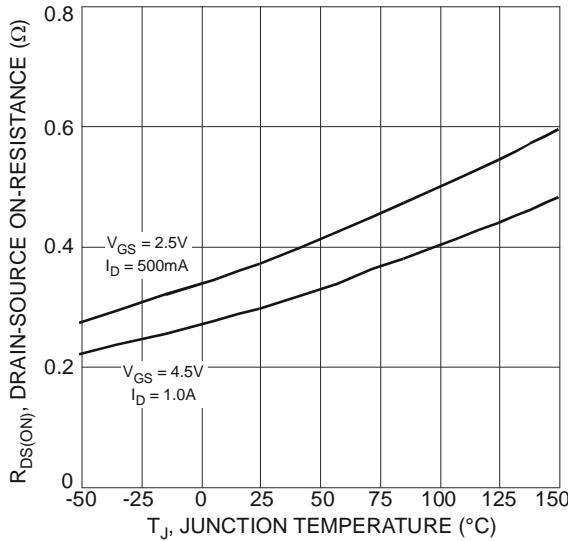


Fig. 6 On-Resistance Variation with Temperature

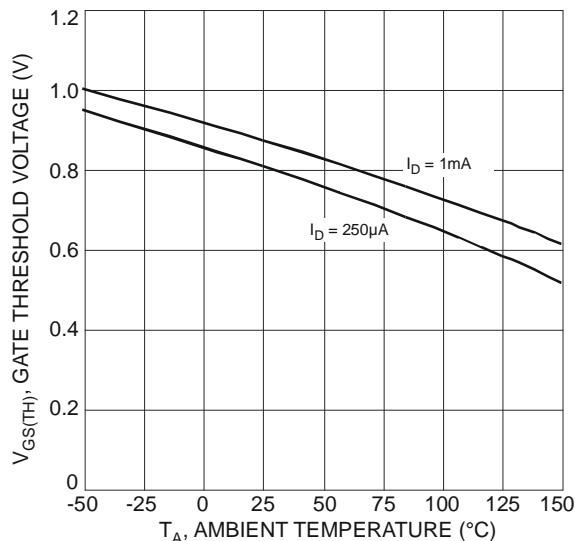


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

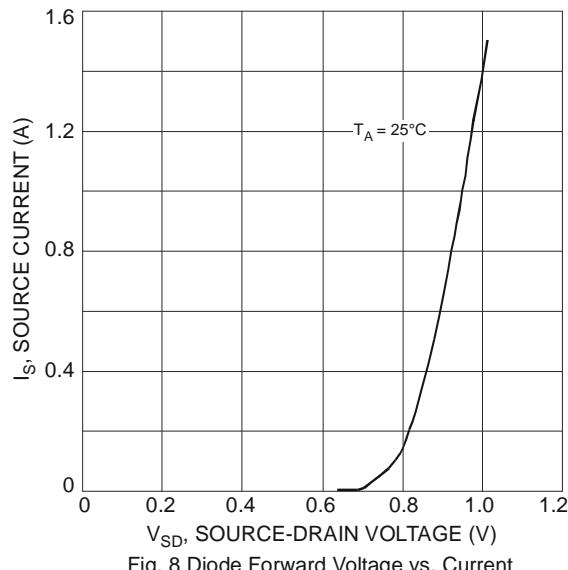


Fig. 8 Diode Forward Voltage vs. Current

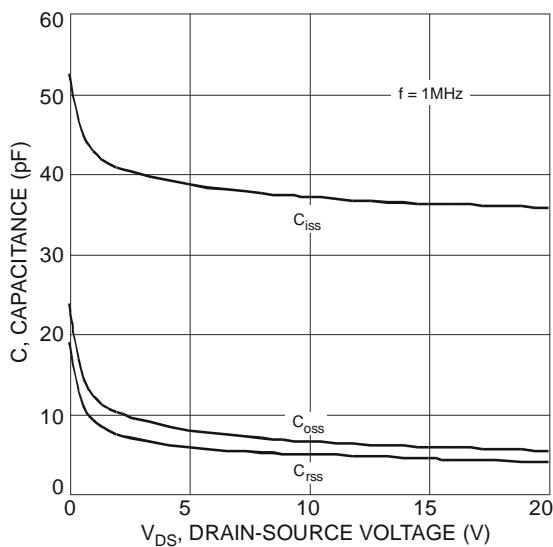


Fig. 9 Typical Capacitance

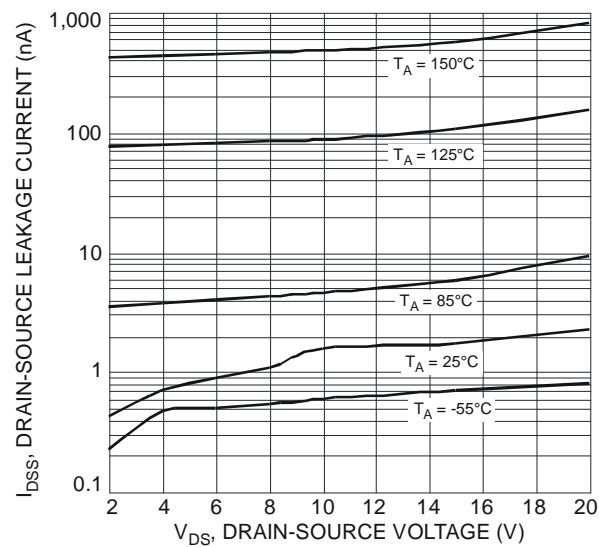


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

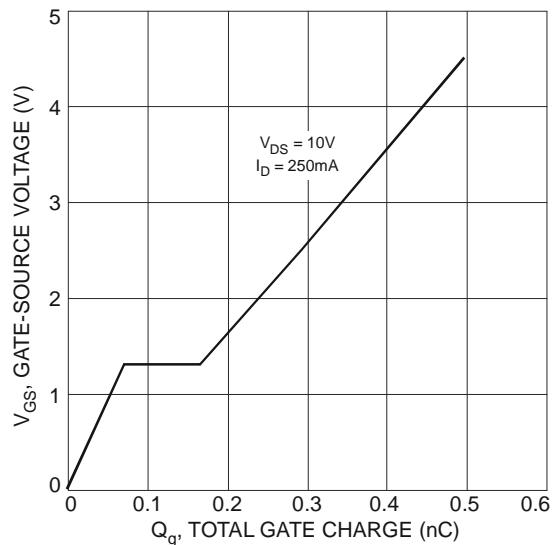


Fig. 11 Gate-Charge Characteristics

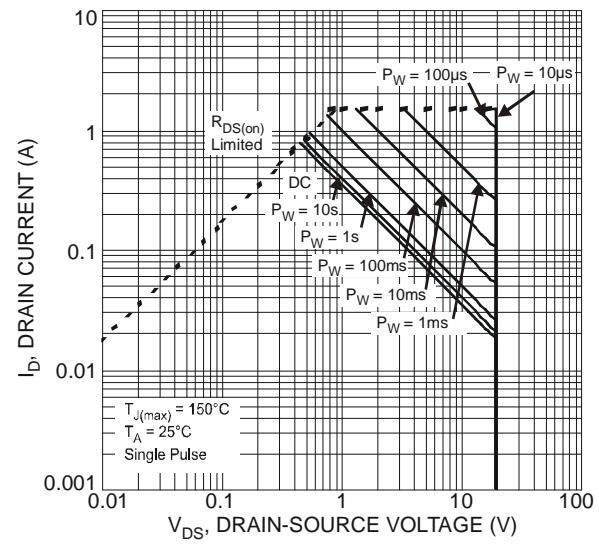


Fig. 12 SOA, Safe Operation Area

Electrical Characteristics - Q2 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}	-20	—	—	V	$V_{\text{GS}} = 0\text{V}$, $I_D = -1\text{mA}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	I_{DSS}	—	—	-100	nA	$V_{\text{DS}} = -20\text{V}$, $V_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 1.0	μA	$V_{\text{GS}} = \pm 5\text{V}$, $V_{\text{DS}} = 0\text{V}$
		—	—	± 10.0		$V_{\text{GS}} = \pm 8\text{V}$, $V_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{\text{GS(th)}}$	-0.5	—	-1.0	V	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{\text{DS (ON)}}$	—	0.67	0.97	Ω	$V_{\text{GS}} = -5\text{V}$, $I_D = -100\text{mA}$
		—	0.7	1.0		$V_{\text{GS}} = -4.5\text{V}$, $I_D = -100\text{mA}$
		—	0.9	1.5		$V_{\text{GS}} = -2.5\text{V}$, $I_D = -80\text{mA}$
		—	1.2	2.0		$V_{\text{GS}} = -1.8\text{V}$, $I_D = -40\text{mA}$
		—	1.5	3.0		$V_{\text{GS}} = -1.5\text{V}$, $I_D = -30\text{mA}$
		—	5	—		$V_{\text{GS}} = -1.2\text{V}$, $I_D = -1\text{mA}$
Diode Forward Voltage	V_{SD}	—	-0.75	-1.2	V	$V_{\text{GS}} = 0\text{V}$, $I_S = -330\text{mA}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	46.1	—	pF	$V_{\text{DS}} = 10\text{V}$, $V_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	7.2	—		
Reverse Transfer Capacitance	C_{rss}	—	4.9	—		
Gate Resistance	R_g	—	14.3	—	Ω	$V_{\text{DS}} = 0\text{V}$, $V_{\text{GS}} = 0\text{V}$,
Total Gate Charge $V_{\text{GS}} = -4.5\text{V}$	Q_g	—	0.5	—	nC	$V_{\text{DS}} = -10\text{V}$, $I_D = -250\text{mA}$
Total Gate Charge $V_{\text{GS}} = -10\text{V}$	Q_g	—	0.85	—		
Gate-Source Charge	Q_{gs}	—	0.09	—		
Gate-Drain Charge	Q_{gd}	—	0.09	—		
Turn-On Delay Time	$t_{\text{D(on)}}$	—	8.5	—	ns	$V_{\text{DD}} = -3\text{V}$, $V_{\text{GS}} = -2.5\text{V}$, $R_L = 300\Omega$, $R_G = 25\Omega$, $I_D = -100\text{mA}$
Turn-On Rise Time	t_r	—	4.3	—		
Turn-Off Delay Time	$t_{\text{D(off)}}$	—	20.2	—		
Turn-Off Fall Time	t_f	—	19.2	—		

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

7. Short duration pulse test used to minimize self-heating effect.

8. Guaranteed by design. Not subject to product testing.

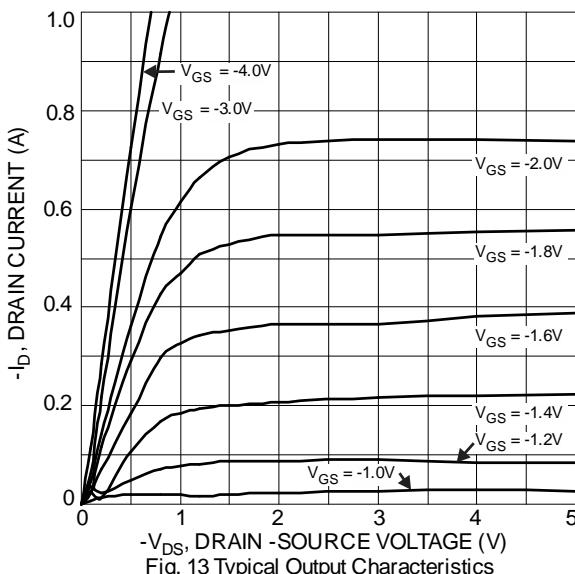


Fig. 13 Typical Output Characteristics

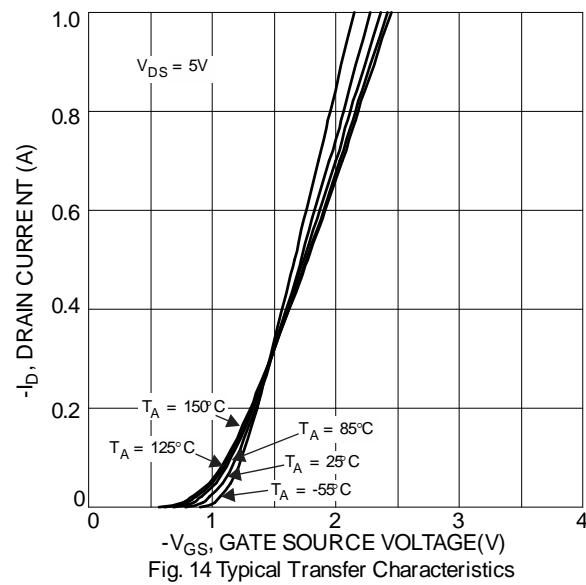


Fig. 14 Typical Transfer Characteristics

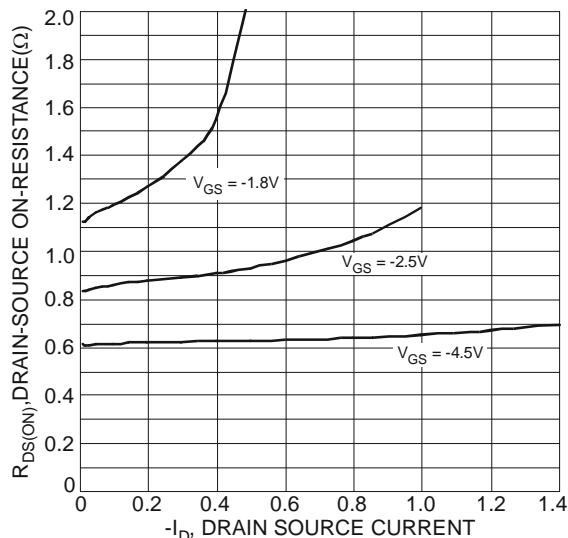


Fig. 15 Typical On-Resistance vs.
Drain Current and Gate Voltage

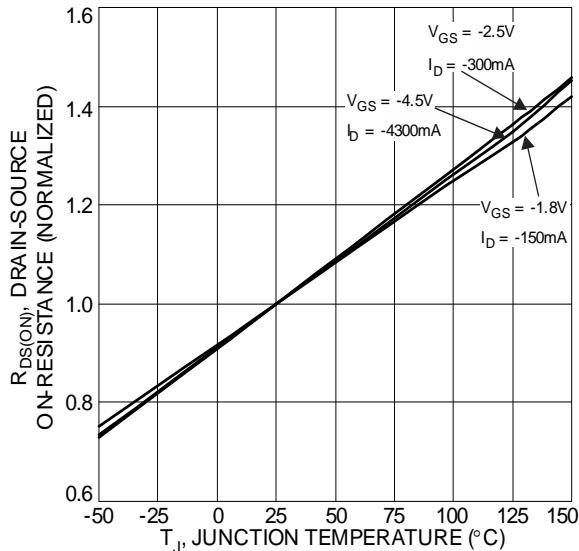


Fig. 17 On-Resistance Variation with Temperature

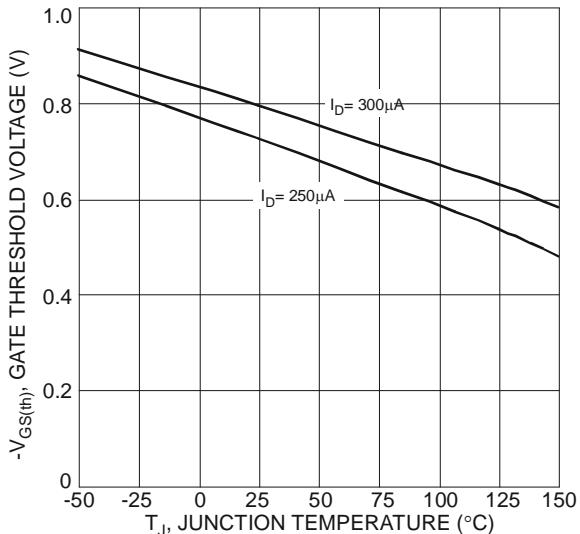


Fig. 19 Gate Threshold Variation vs. Ambient Temperature

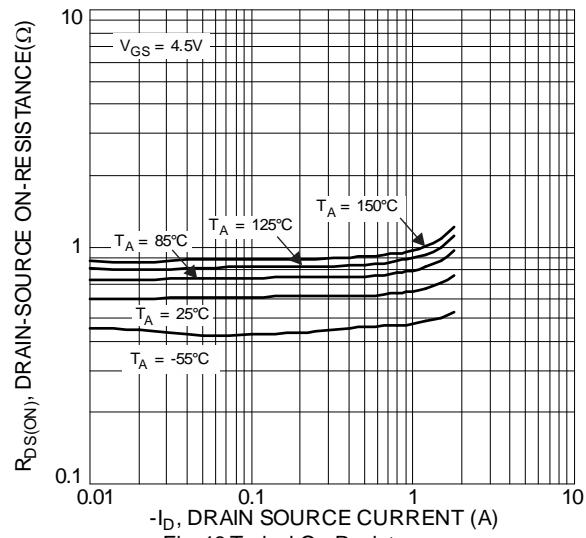


Fig. 16 Typical On-Resistance vs.
Drain Current and Temperature

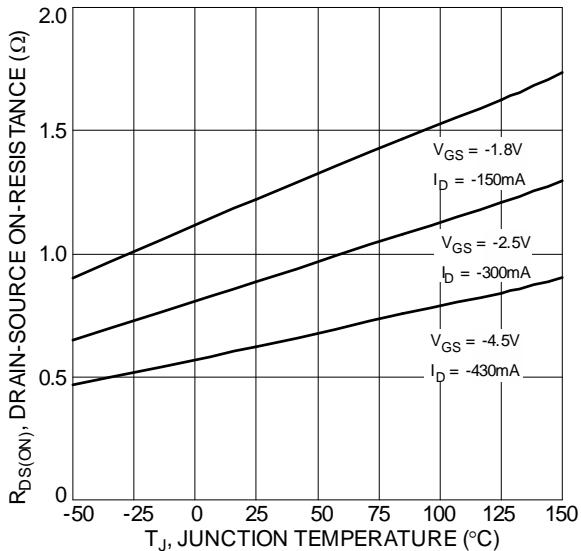


Fig. 18 On-Resistance vs. Temperature

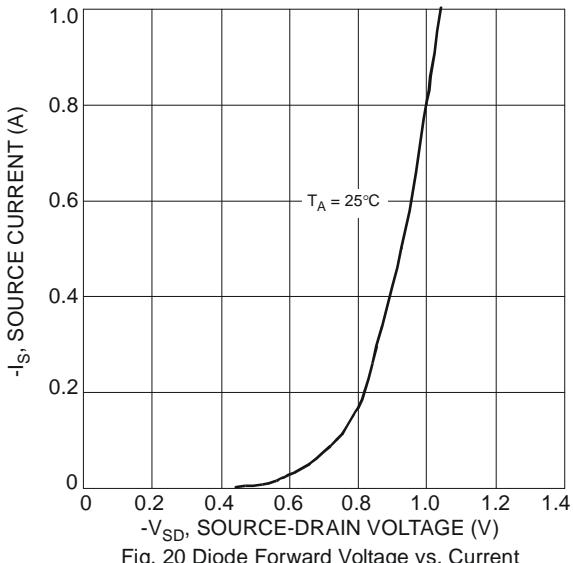


Fig. 20 Diode Forward Voltage vs. Current

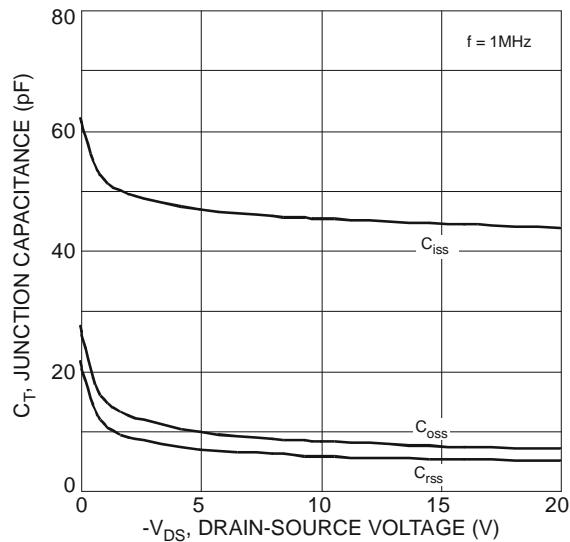


Fig. 21 Typical Junction Capacitance

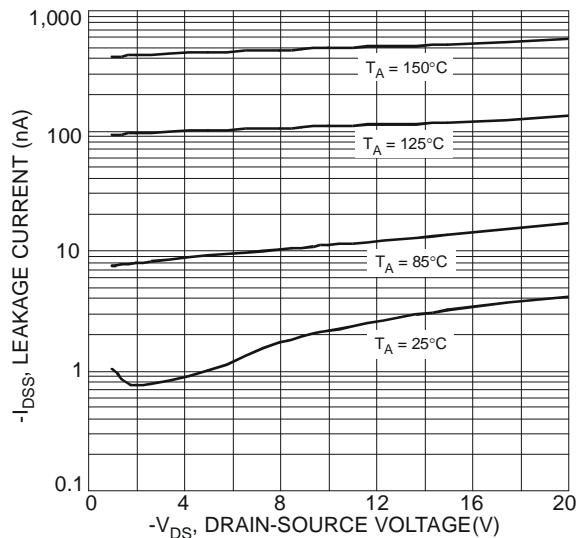


Fig. 22 Typical Drain-Source Leakage Current vs. Voltage

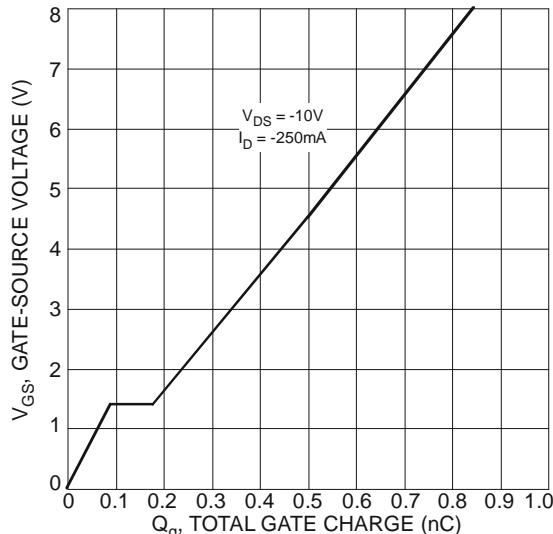


Fig. 23 Gate-Charge Characteristics

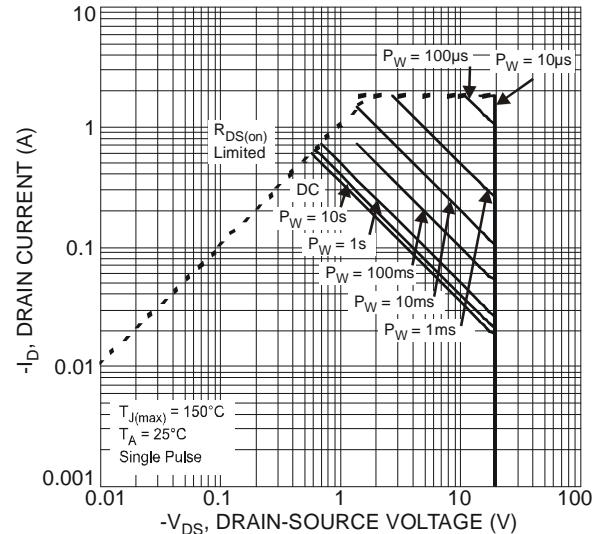


Fig. 24 SOA, Safe Operation Area

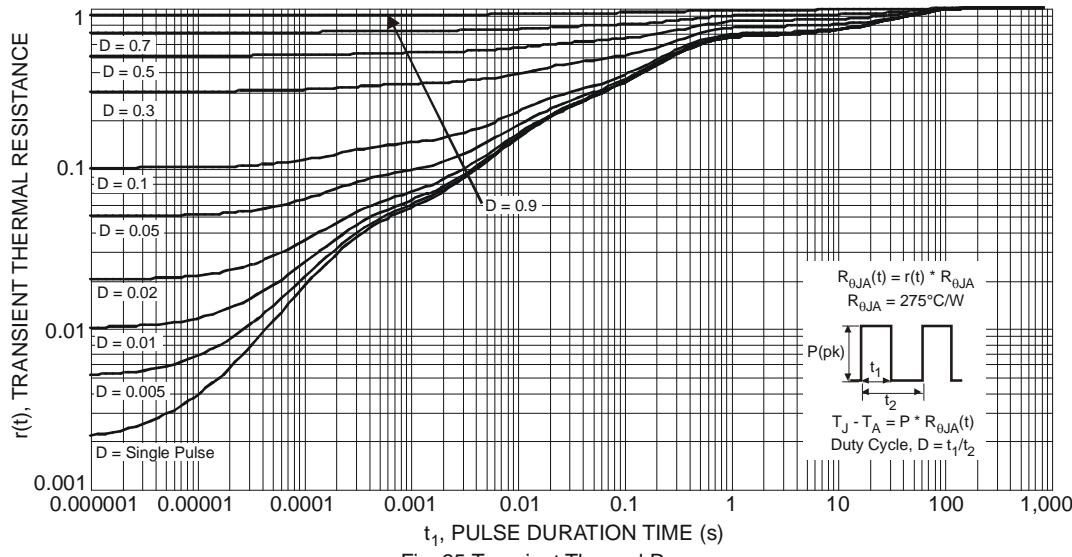
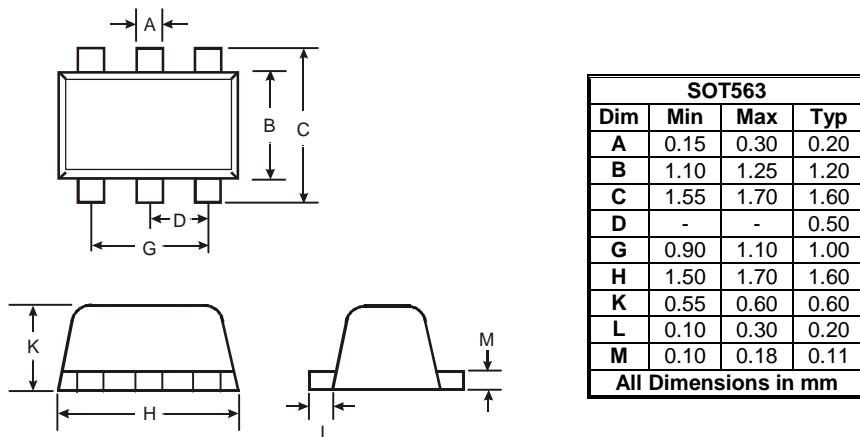


Fig. 25 Transient Thermal Response

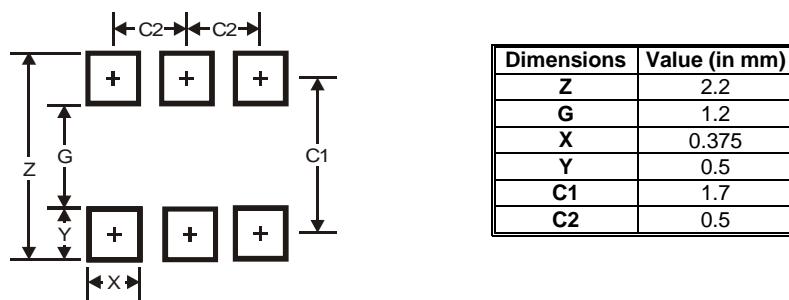
Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



Suggested Pad Layout

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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