

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25^\circ\text{C}$
Q1	25V	4Ω @ $V_{GS} = 4.5\text{V}$	0.4 A
Q2	-30V	80mΩ @ $V_{GS} = -12\text{V}$	-3.2 A
		125mΩ @ $V_{GS} = -4.5\text{V}$	-2.6 A

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

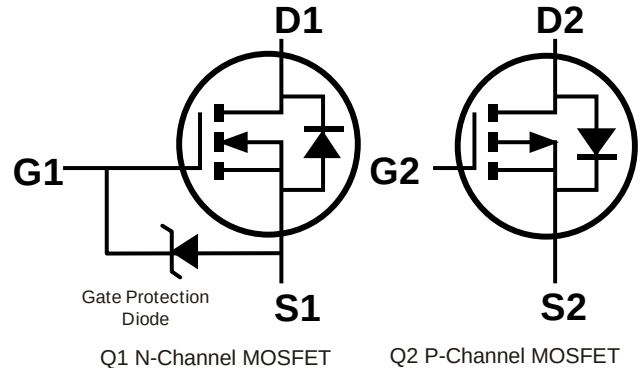
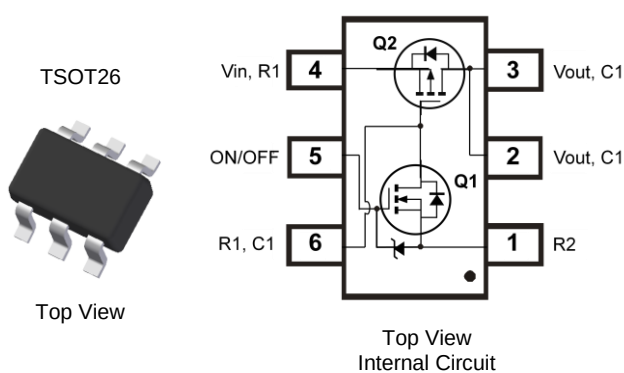
- DC-DC Converters
- Power Management Functions
- Load Switch

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate on N-Channel (>6kV Human Body Model)
- **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: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe.
Solderable per MIL-STD-202, Method 208 **(e3)**
- Weight: 0.013 grams (Approximate)

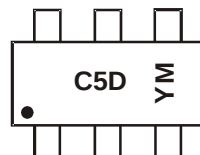


Ordering Information (Note 4)

Part Number	Case	Packaging
DMC25D0UVT-7	TSOT26	3000 / Tape & Reel
DMC25D0UVT-13	TSOT26	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



C5D = Product Type Marking Code
YM or YM = Date Code Marking
Y or 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 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	25	V
Gate-Source Voltage	V _{GSS}	-0.5 +8	V
Continuous Drain Current (Note 5) V _{GS} = 4.5V	I _D	0.4	A
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	1.2	A
Pulsed Drain Current (Note 6)	I _{DM}	1.5	A

Maximum Ratings – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	-30	V
Gate-Source Voltage	V _{GSS}	±12	V
Continuous Drain Current (Note 5) V _{GS} = -10V	I _D	Steady State Note 9	-3.2 A
			-14.4 A
Continuous Drain Current (Note 5) V _{GS} = -4.5V	I _D	-2.6	A
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	-1.2	A
Pulsed Drain Current (Note 6)	I _{DM}	-20	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady State Note 9	101 °C/W
			5 °C/W
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	37	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	25	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	100	nA	V _{GS} = 8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.65	0.85	1.5	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	3.8	4	Ω	V _{GS} = 4.5V, I _D = 0.4A
Diode Forward Voltage	V _{SD}	—	0.76	1.2	V	V _{GS} = 0V, I _S = 0.29A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	26.2	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	7.1	—		
Reverse Transfer Capacitance	C _{rss}	—	2.7	—		
Gate Resistance	R _g	—	84.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	0.4	—	nC	V _{DS} = 5V, I _D = 0.2A
Total Gate Charge (V _{GS} = 8V)	Q _g	—	0.7	—		
Gate-Source Charge	Q _{gs}	—	0.1	—		
Gate-Drain Charge	Q _{gd}	—	0.1	—		
Turn-On Delay Time	t _{D(ON)}	—	3	—	ns	V _{GS} = 4.5V, V _{DS} = 6V, R _G = 50Ω, I _D = 0.5A
Turn-On Rise Time	t _R	—	2.3	—		
Turn-Off Delay Time	t _{D(OFF)}	—	7.7	—		
Turn-Off Fall Time	t _F	—	3.7	—		

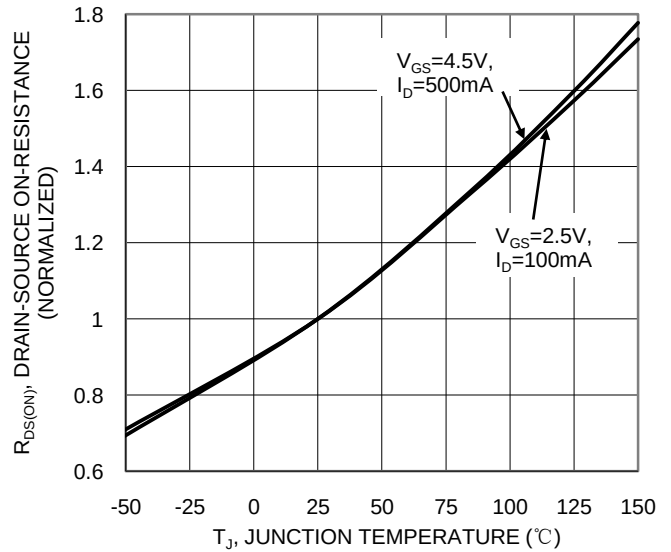
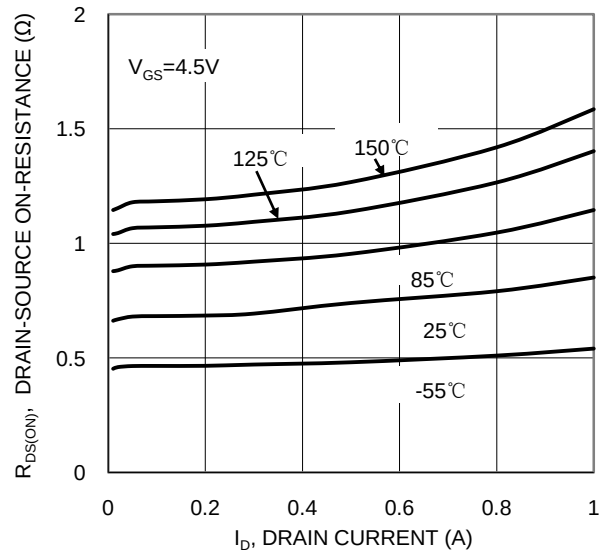
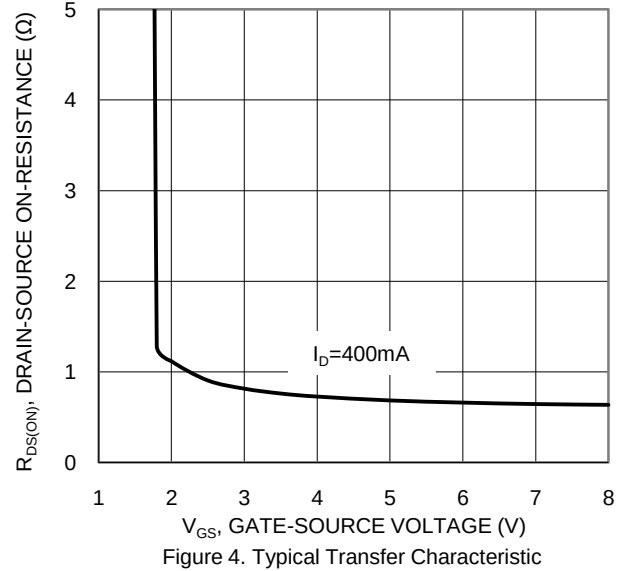
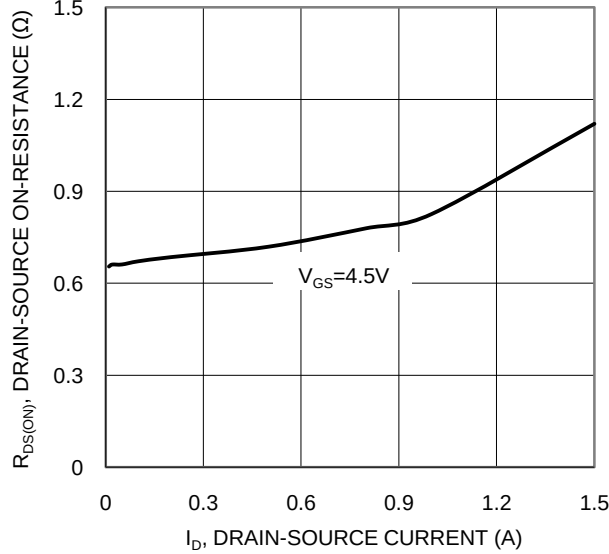
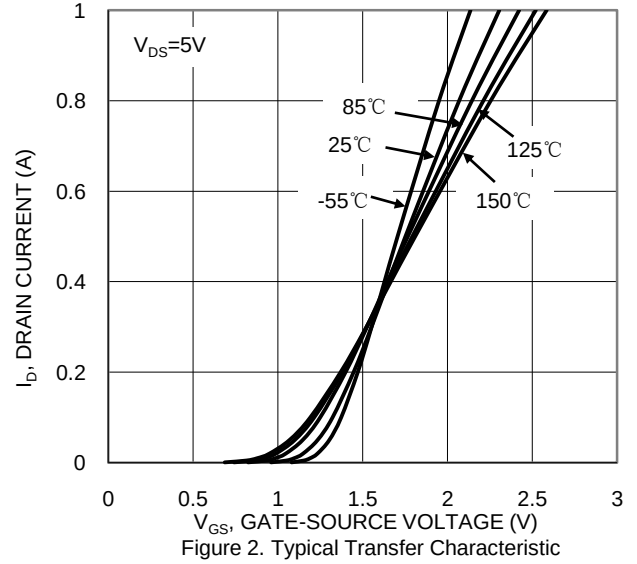
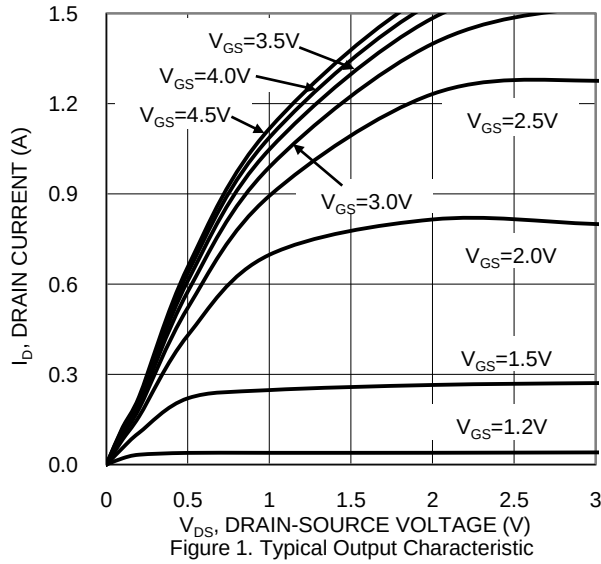
- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.
 - Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%.

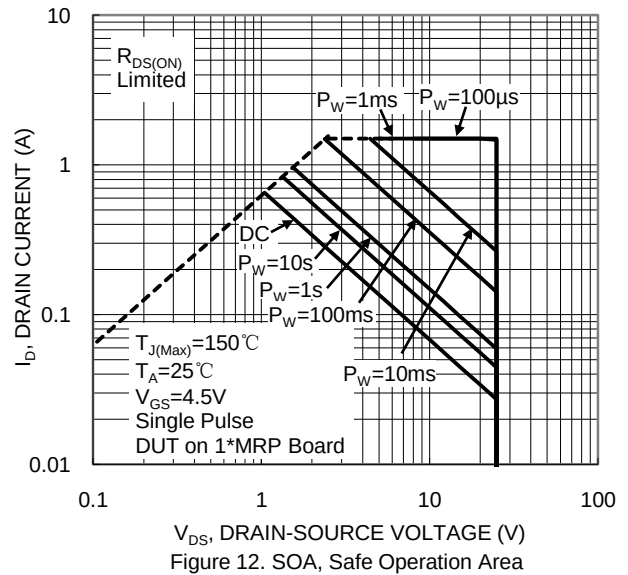
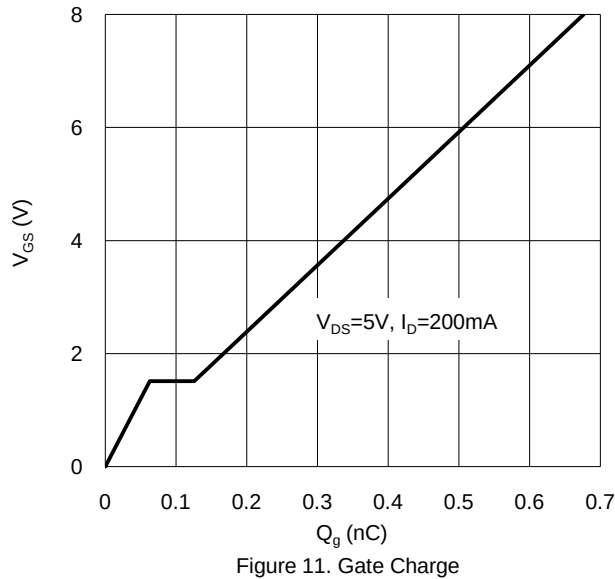
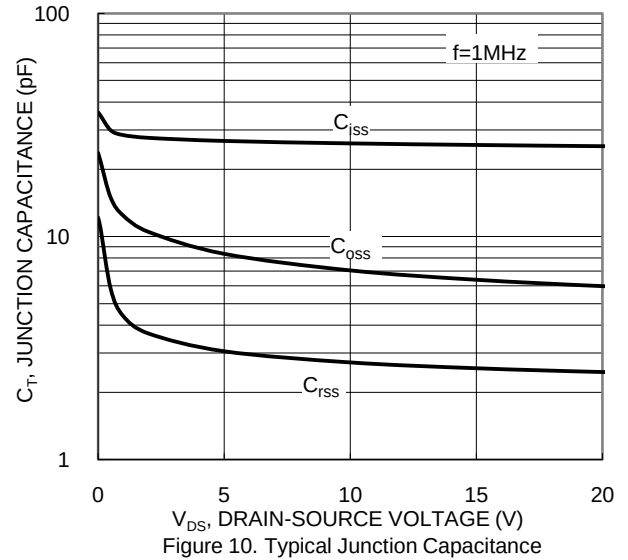
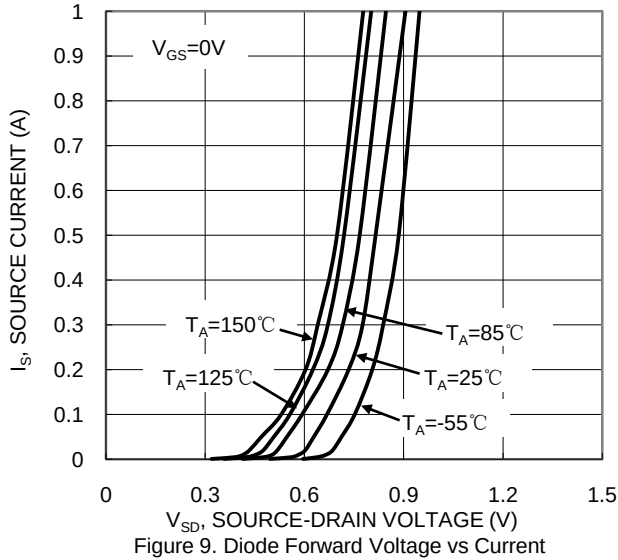
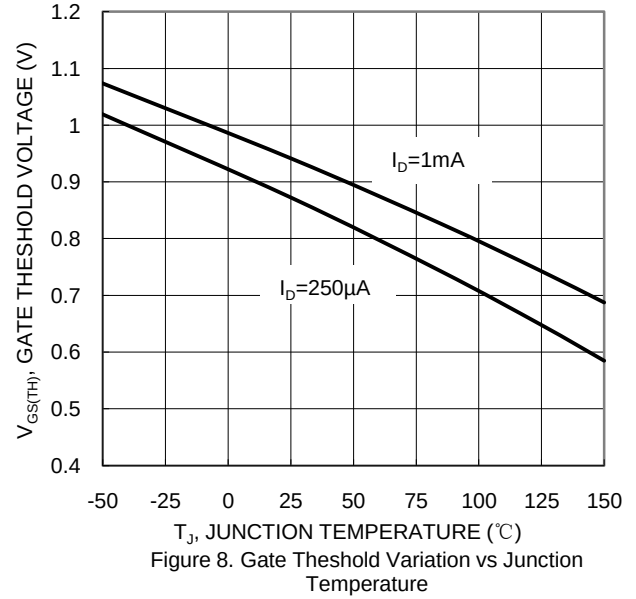
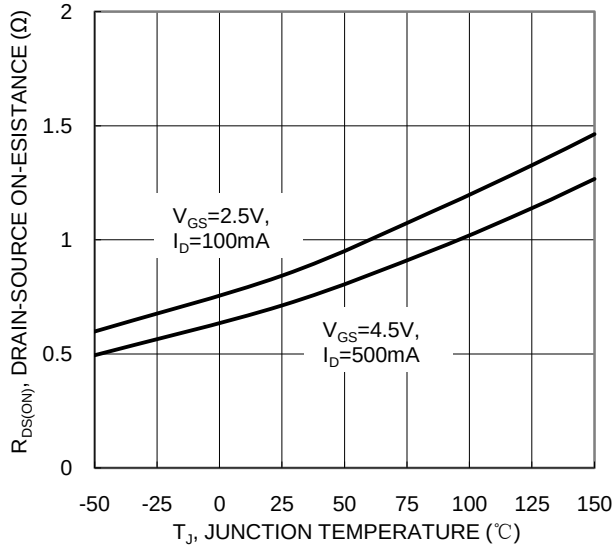
Electrical Characteristics – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV _{DSS}	-30	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	μA	V _{DS} = -24V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	V _{GS(TH)}	-0.5	-0.9	-1.5	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	59	80	mΩ	V _{GS} = -12V, I _D = -2.3A
		—	75	125		V _{GS} = -4.5V, I _D = -1.9A
		—	—	300		V _{GS} = -2.5V, I _D = -1A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C _{iss}	—	854	—	pF	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz
Output Capacitance	C _{oss}	—	53	—		
Reverse Transfer Capacitance	C _{rss}	—	47	—		
Gate Resistance	R _g	—	11	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	10	—	nC	V _{DS} = -15V, I _D = -4A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	21	—		
Gate-Source Charge	Q _{gs}	—	1.5	—		
Gate-Drain Charge	Q _{gd}	—	2.8	—		
Turn-On Delay Time	t _{D(ON)}	—	3.5	—	ns	V _{GS} = -10V, V _{DS} = -15V, R _G = 6Ω, I _D = -1A
Turn-On Rise Time	t _R	—	3.3	—		
Turn-Off Delay Time	t _{D(OFF)}	—	61.4	—		
Turn-Off Fall Time	t _F	—	14.6	—		

Notes: 10. Short duration pulse test used to minimize self-heating effect.
11. Guaranteed by design. Not subject to production testing.

Typical Characteristics - N-CHANNEL





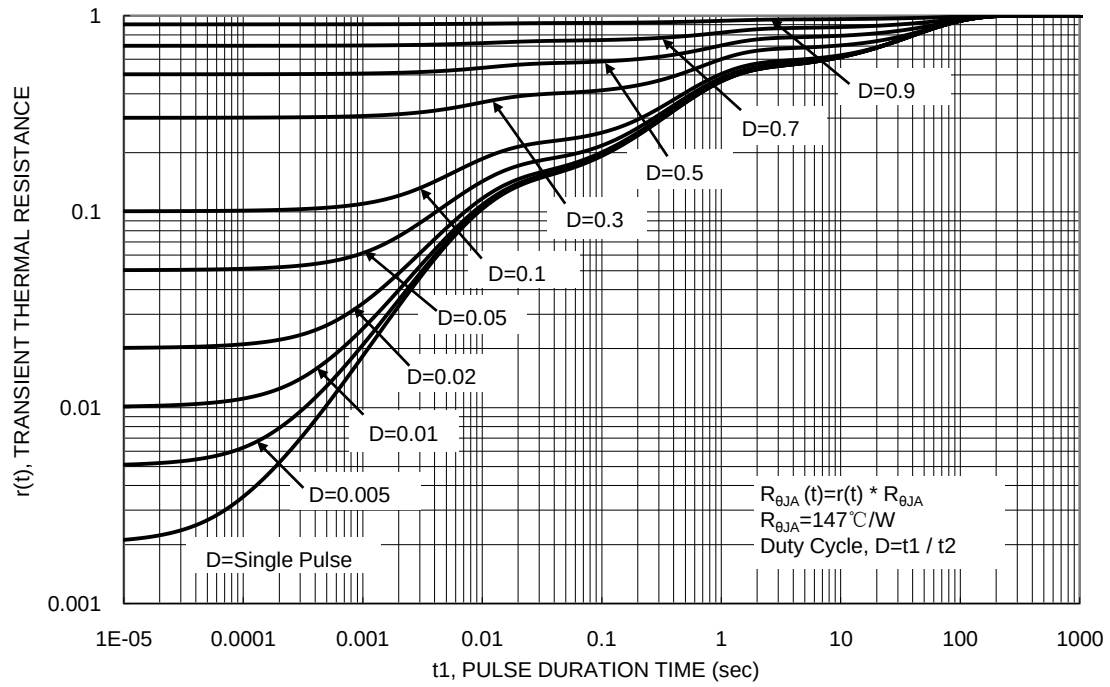


Figure 13. Transient Thermal Resistance

Typical Characteristics - P-CHANNEL

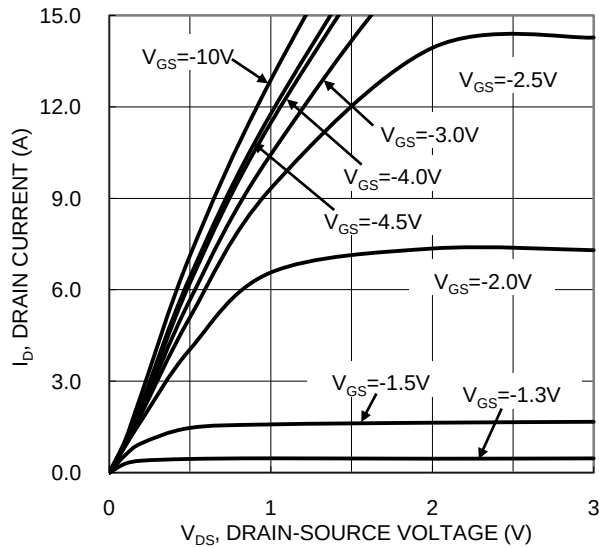


Figure 14. Typical Output Characteristic

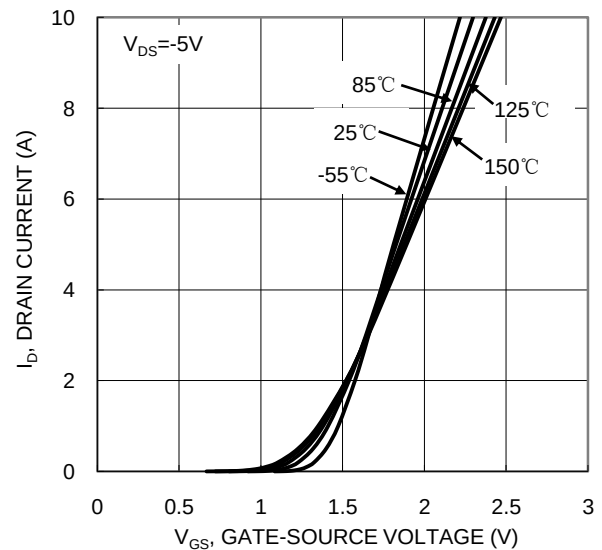


Figure 15. Typical Transfer Characteristic

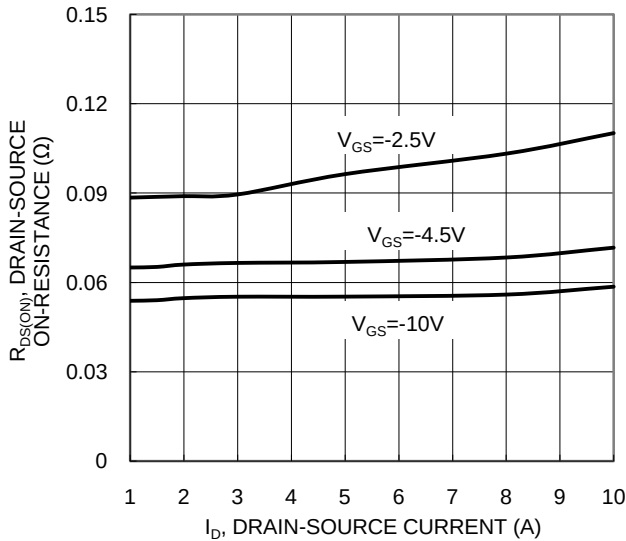


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

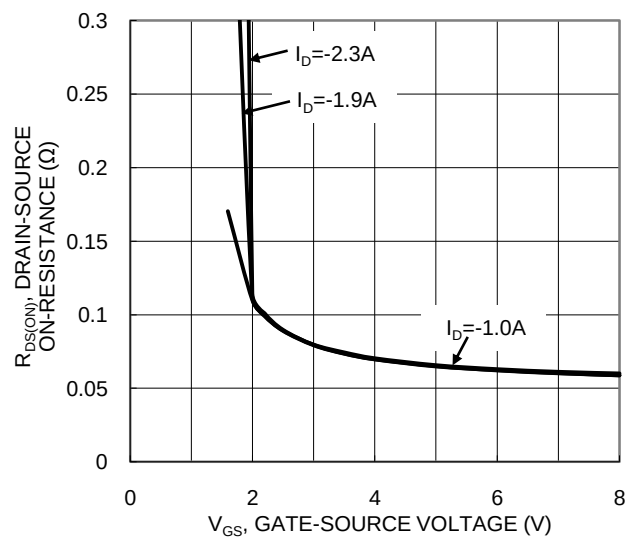


Figure 17. Typical Transfer Characteristic

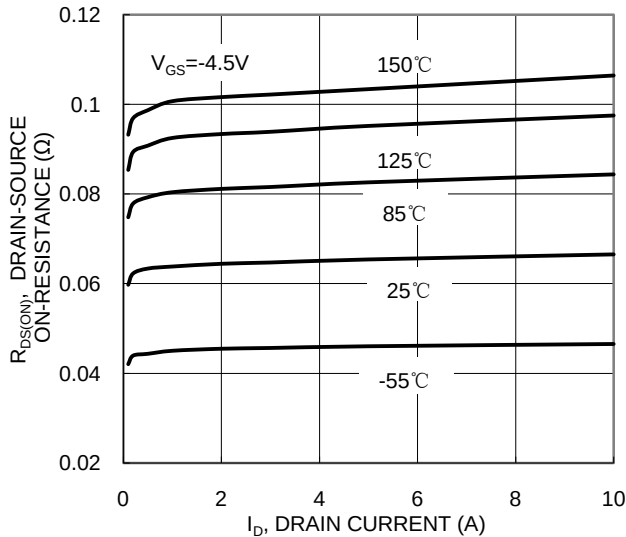


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

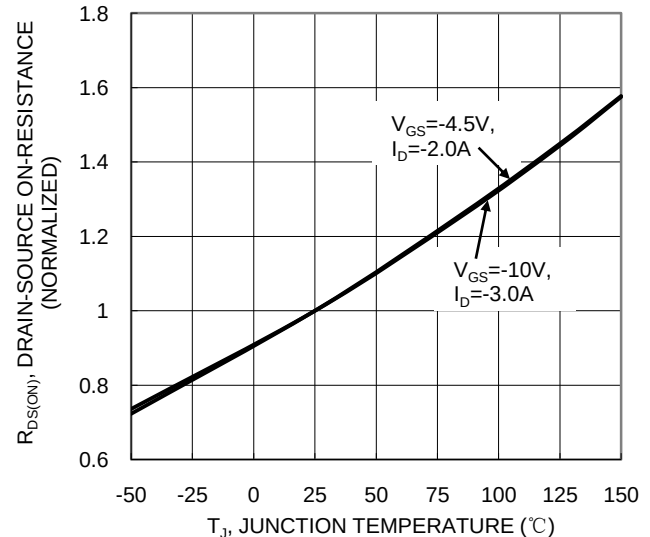


Figure 19. On-Resistance Variation with Temperature

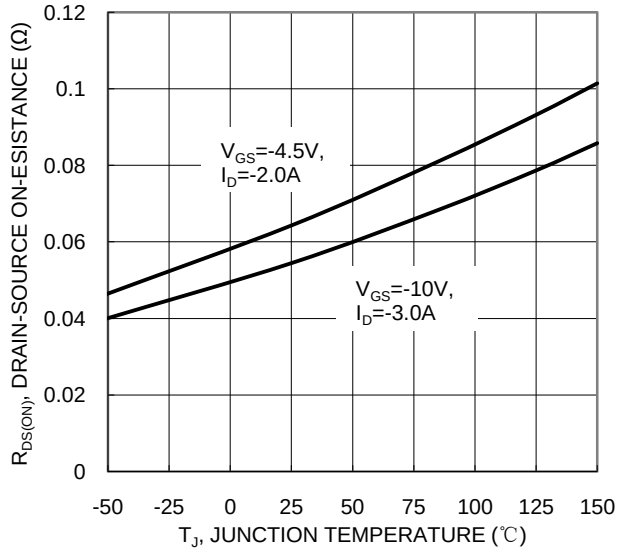


Figure 20. On-Resistance Variation with Temperature

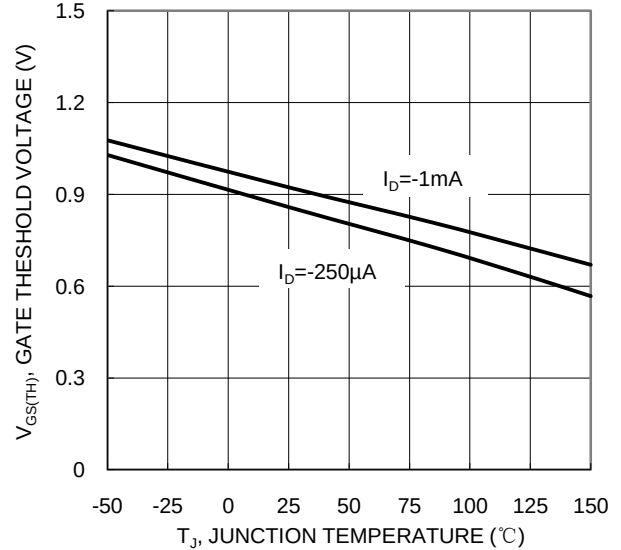


Figure 21. Gate Threshold Variation vs Junction Temperature

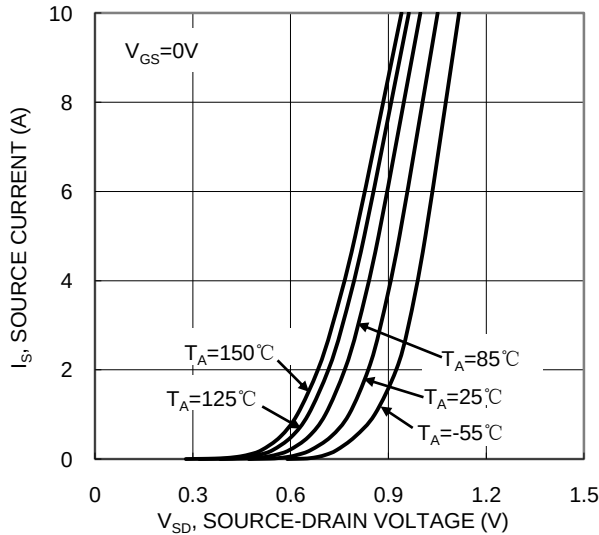


Figure 22. Diode Forward Voltage vs Current

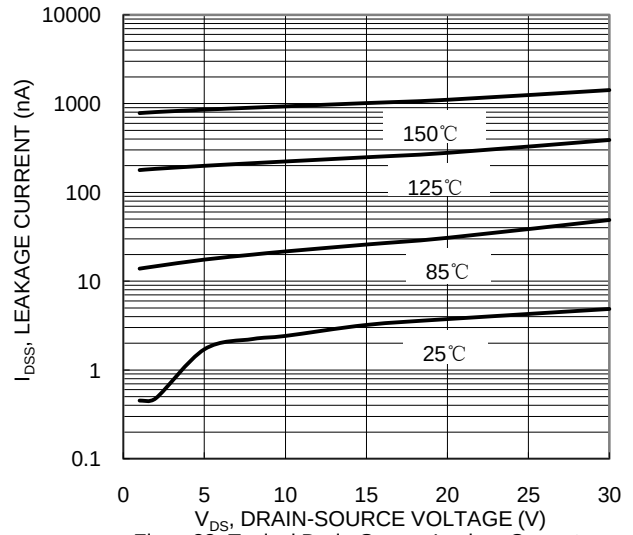


Figure 23. Typical Drain-Source Leakage Current vs Voltage

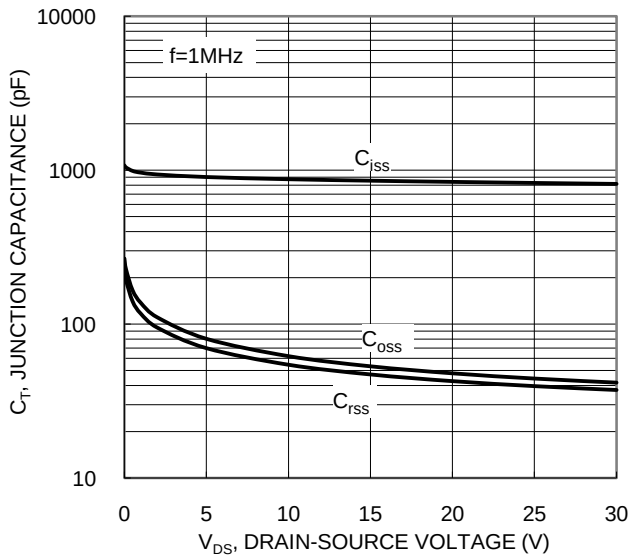


Figure 24. Typical Junction Capacitance

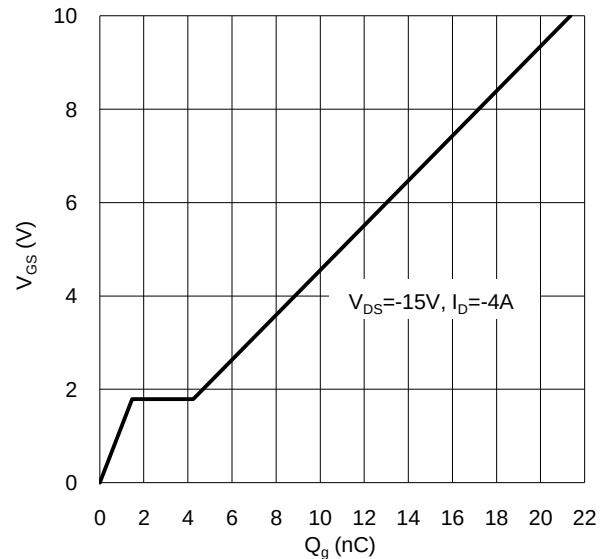
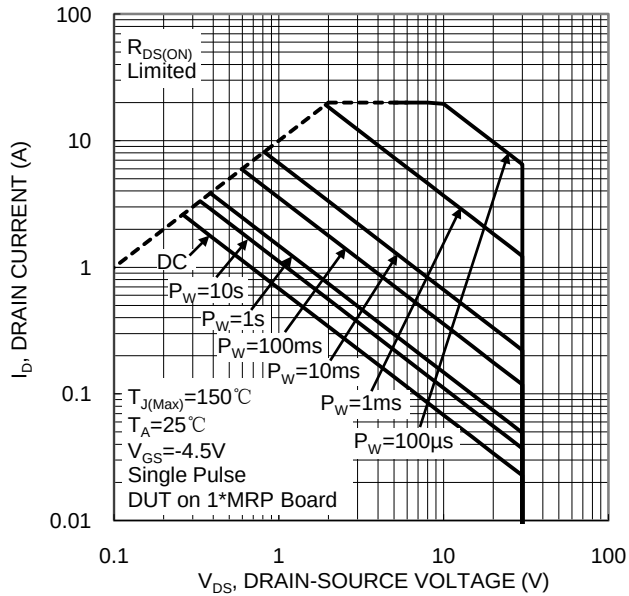
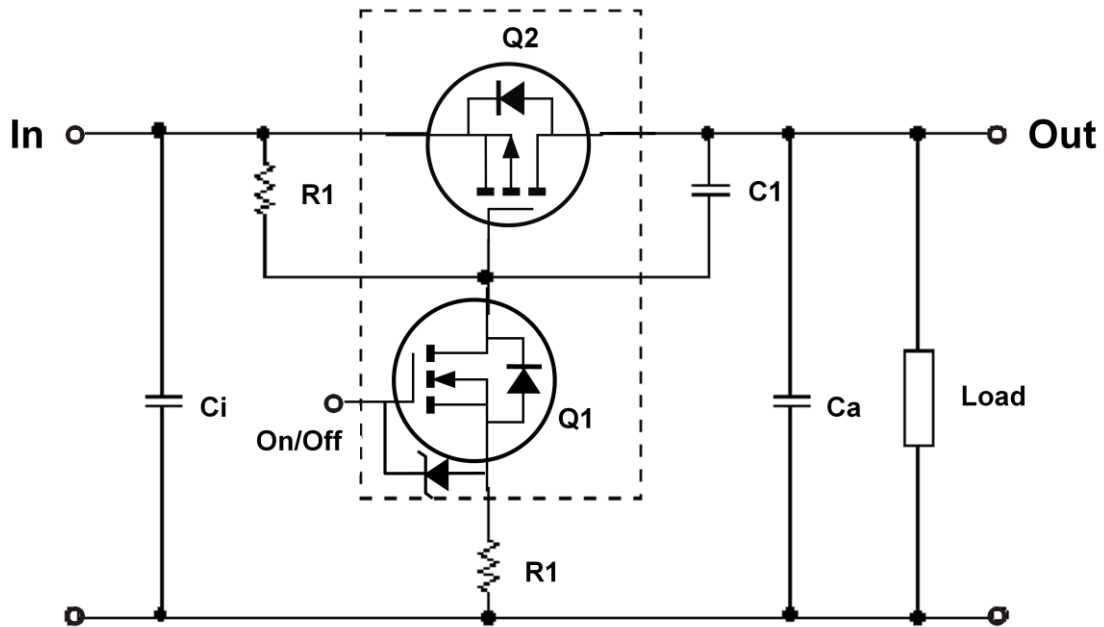


Figure 25. Gate Charge

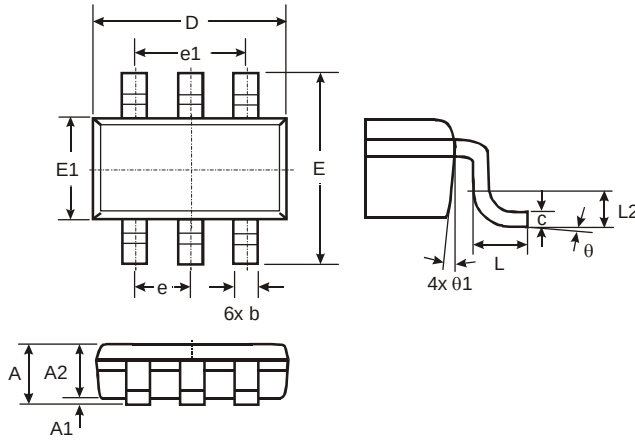


Application Circuit



Package Outline Dimensions

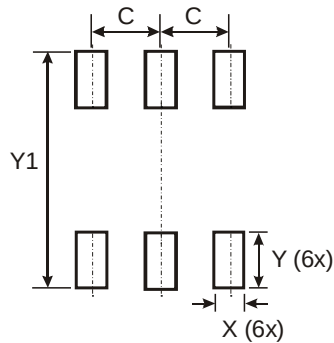
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



TSOT26			
Dim	Min	Max	Typ
A	—	1.00	—
A1	0.01	0.10	—
A2	0.84	0.90	—
D	—	—	2.90
E	—	—	2.80
E1	—	—	1.60
b	0.30	0.45	—
c	0.12	0.20	—
e	—	—	0.95
e1	—	—	1.90
L	0.30	0.50	—
L2	—	—	0.25
θ	0°	8°	4°
θ1	4°	12°	—
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.950
X	0.700
Y	1.000
Y1	3.199

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