

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 @ $V_{GS} = 4.5\text{V}$	0.5A
Q2	-12V	55mΩ @ $V_{GS} = -4.5\text{V}$	-3.9A
		70mΩ @ $V_{GS} = -2.5\text{V}$	-3.5A

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

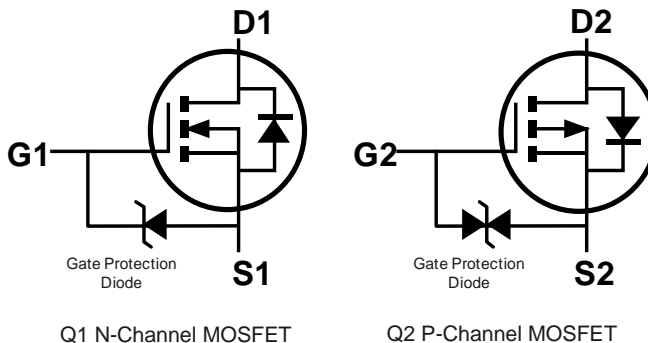
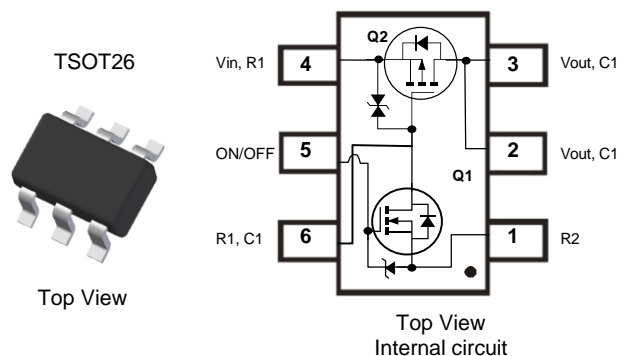
- DC-DC Converters
- Power Management Functions
- Load Switch

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Gate
- **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**

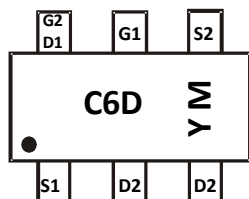
Mechanical Data

- Case: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e3)
- Weight: 0.013 grams (Approximate)

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Ordering Information (Note 4)

Part Number	Case	Packaging
DMC25D1UVT-7	TSOT26	3000 / Tape & Reel
DMC25D1UVT-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


C6D = 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	0.5	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}	-12	V
Gate-Source Voltage	V _{GSS}	±8	V
Continuous Drain Current (Note 5) V _{GS} = -4.5V	I _D	Steady State	-3.9
		Note 9	-17.4
Continuous Drain Current (Note 5) V _{GS} = -2.5V	I _D	-2.82	A
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	-40	A
Pulsed Drain Current (Note 6)	I _{DM}	-40	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P _D	1.3	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	Steady State	100
		Note 9	5
Thermal Resistance, Junction to Case (Note 5)	R _{θJC}	36	°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.)

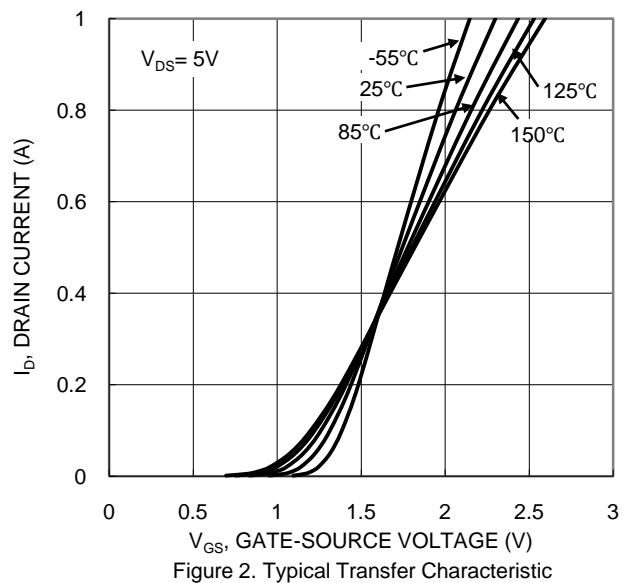
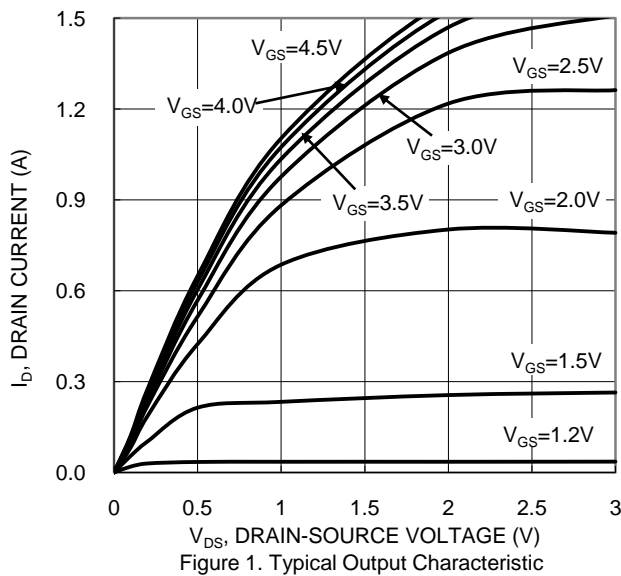
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	25	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	100	nA	V _{GS} = 8V, V _{DS} = 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}	—	27.6	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	8.5	—		
Reverse Transfer Capacitance	C _{rss}	—	3.3	—		
Gate Resistance	R _g	—	25	—	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} = 10V)	Q _g	—	0.9	—		
Gate-Source Charge	Q _{gs}	—	0.1	—		
Gate-Drain Charge	Q _{gd}	—	0.04	—		
Turn-On Delay Time	t _{D(ON)}	—	2.5	—	ns	V _{GS} = 4.5V, V _{DS} = 6V, R _G = 50Ω, I _D = 0.5A
Turn-On Rise Time	t _R	—	1.4	—		
Turn-Off Delay Time	t _{D(OFF)}	—	5.7	—		
Turn-Off Fall Time	t _F	—	4.3	—		

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1in. 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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 10)						
Drain-Source Breakdown Voltage	BV_{DSS}	-12	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	$V_{DS} = -6.4V, V_{GS} = 0V$
Gate-Source Leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 10)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.35	—	-1.5	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	—	55	m Ω	$V_{GS} = -4.5V, I_D = -2.8A$
		—	—	70		$V_{GS} = -2.5V, I_D = -2.5A$
		—	—	100		$V_{GS} = -1.8V, I_D = -2.0A$
Diode Forward Voltage	V_{SD}	—	—	-1.2	V	$V_{GS} = 0V, I_S = -0.6A$
DYNAMIC CHARACTERISTICS (Note 11)						
Input Capacitance	C_{iss}	—	9.7	—	pF	$V_{DS} = -6V, V_{GS} = 0V, f = 1MHz$
Output Capacitance	C_{oss}	—	393	—		
Reverse Transfer Capacitance	C_{rss}	—	1.9	—		
Gate Resistance	R_g	—	1846	—	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$
Total Gate Charge ($V_{GS} = -4.5V$)	Q_g	—	24.5	—	nC	$V_{DS} = -6V, I_D = -2.8A$
Gate-Source Charge	Q_{gs}	—	3.3	—		
Gate-Drain Charge	Q_{gd}	—	7.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	1.2	—	μs	$V_{GS} = -4.5V, V_{DS} = -6V, R_G = 6\Omega, I_D = -2.8A$
Turn-On Rise Time	t_R	—	2.7	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	9.8	—		
Turn-Off Fall Time	t_F	—	6.5	—		

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


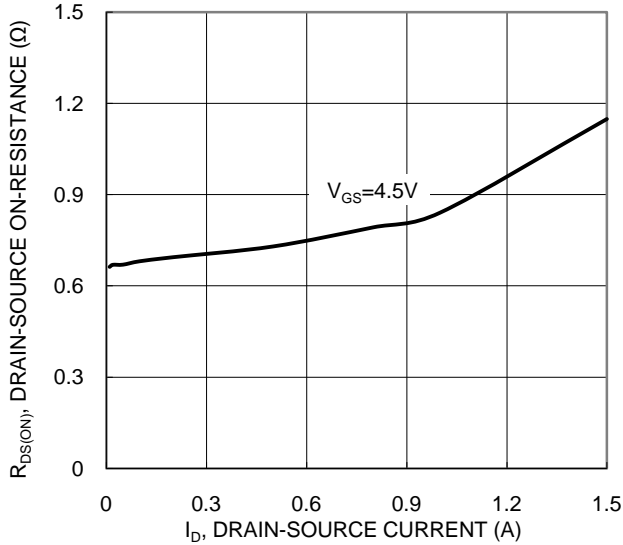


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

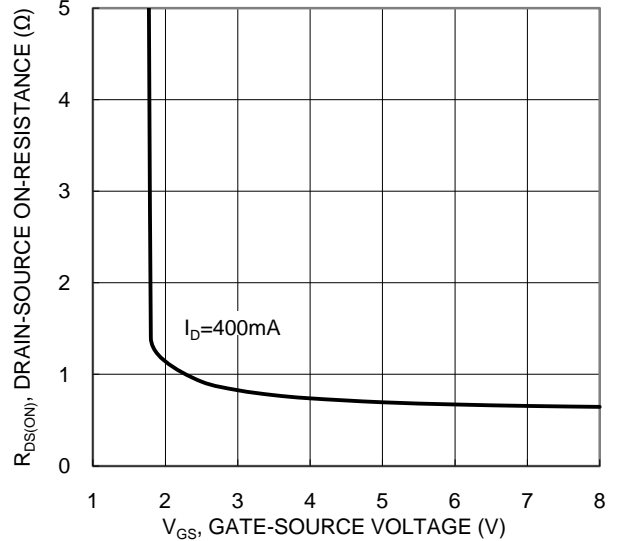


Figure 4. Typical Transfer Characteristic

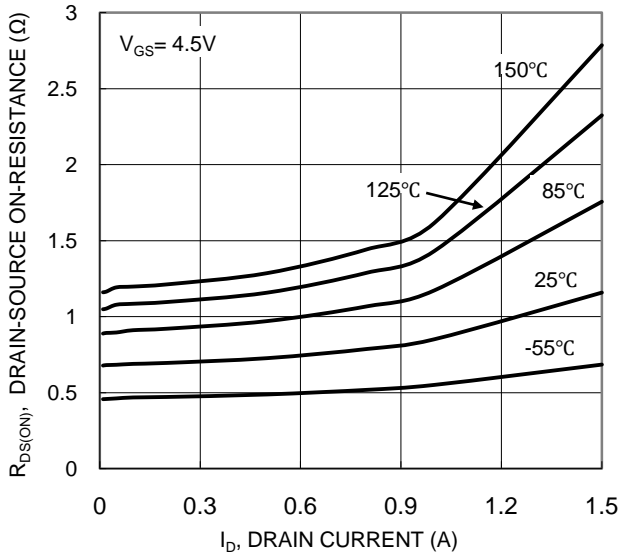


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

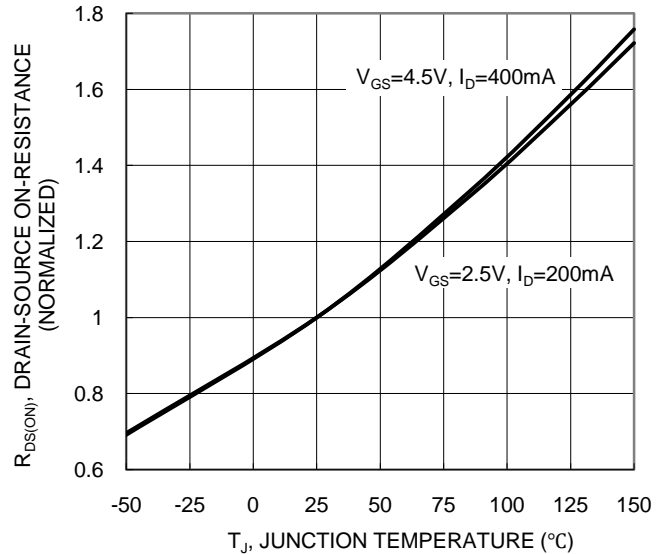


Figure 6. On-Resistance Variation with Temperature

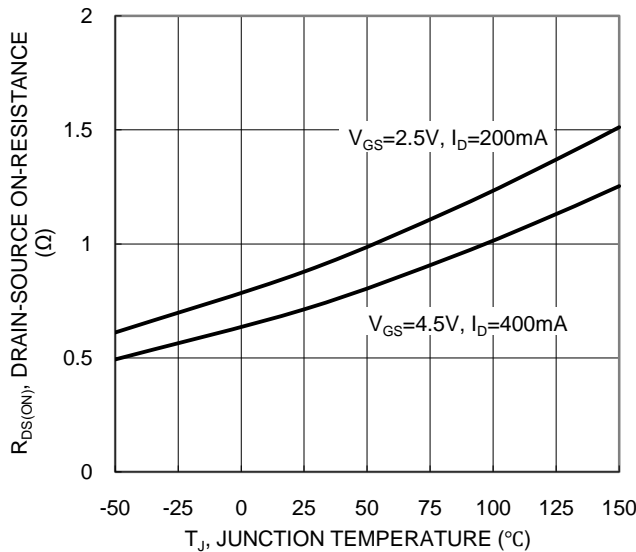


Figure 7. On-Resistance Variation with Temperature

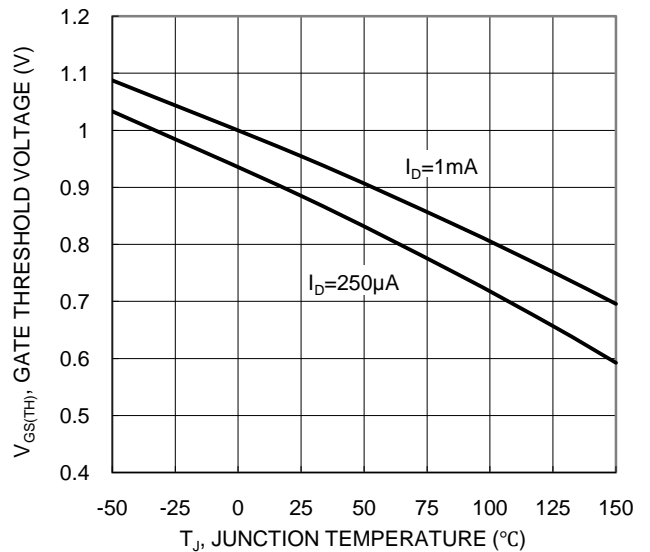


Figure 8. Gate Threshold Variation vs. Junction Temperature

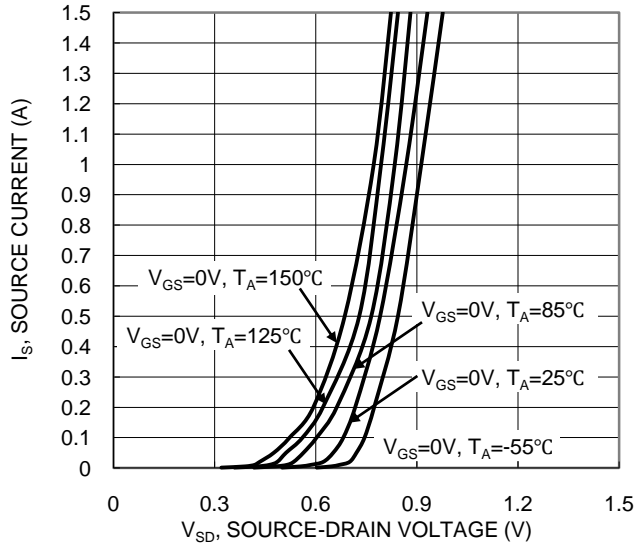


Figure 9. Diode Forward Voltage vs. Current

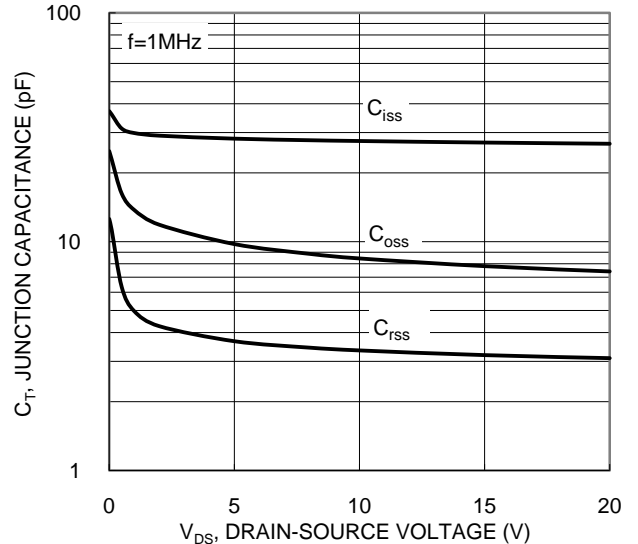


Figure 10. Typical Junction Capacitance

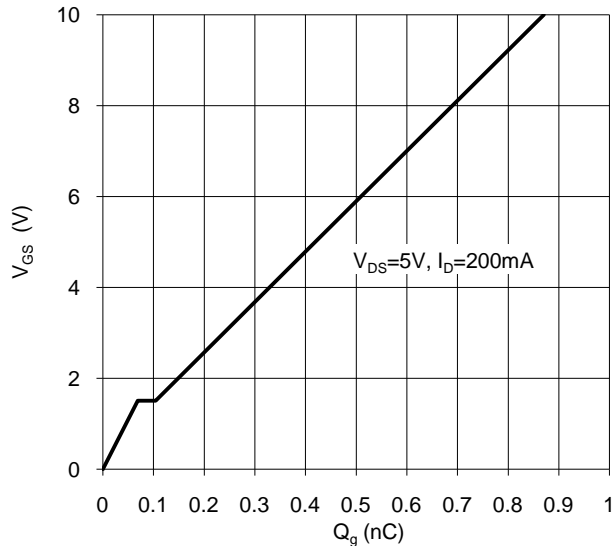


Figure 11. Gate Charge

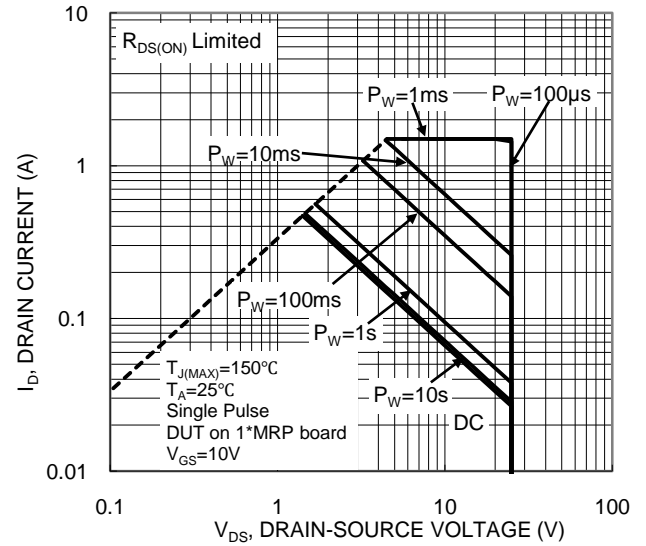


Figure 12. SOA, Safe Operation Area

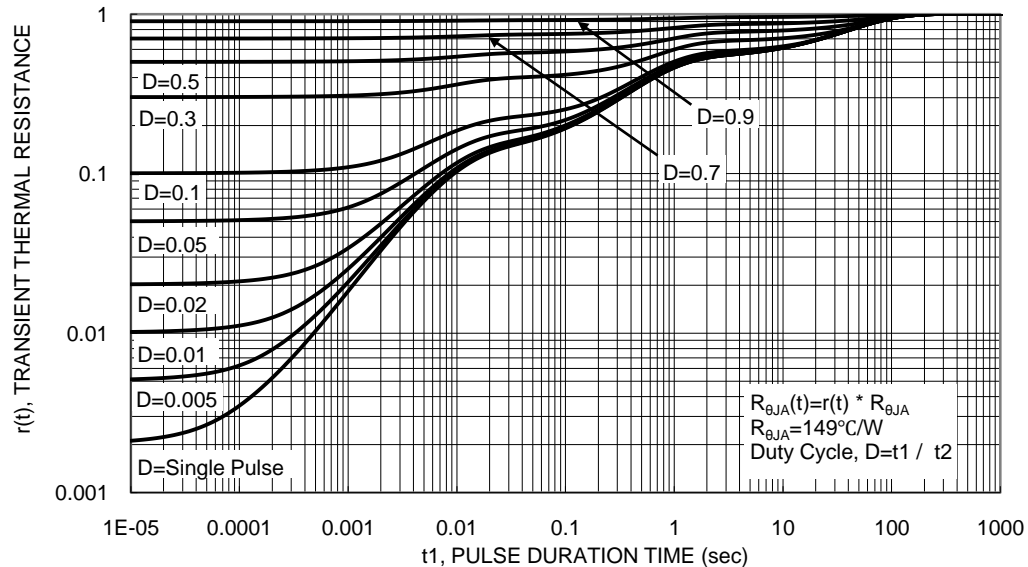


Figure 13. Transient Thermal Resistance

Typical Characteristics - P-CHANNEL

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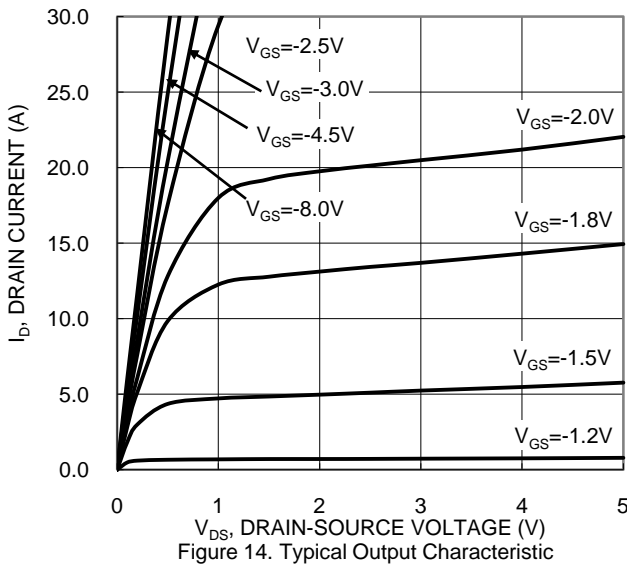


Figure 14. Typical Output Characteristic

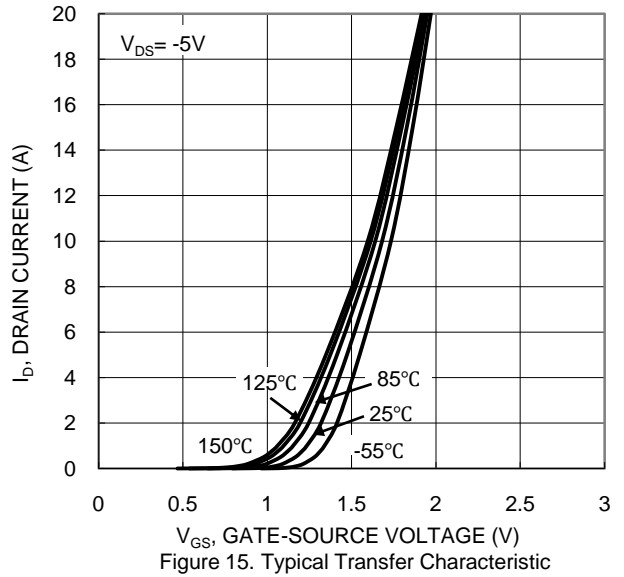


Figure 15. Typical Transfer Characteristic

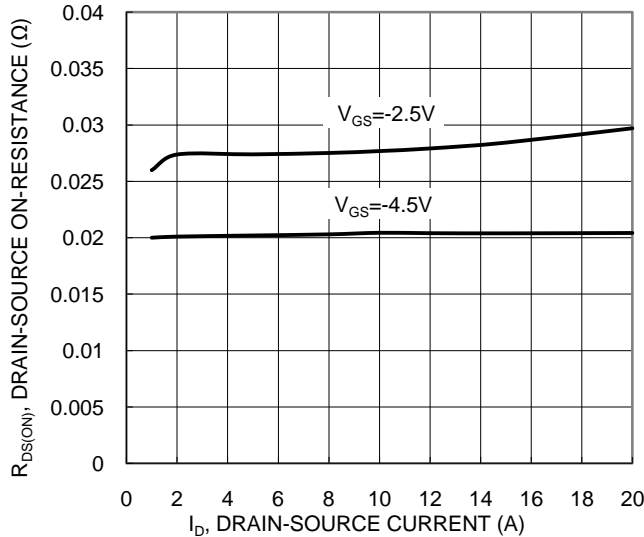


Figure 16. Typical On-Resistance vs. Drain Current and Gate Voltage

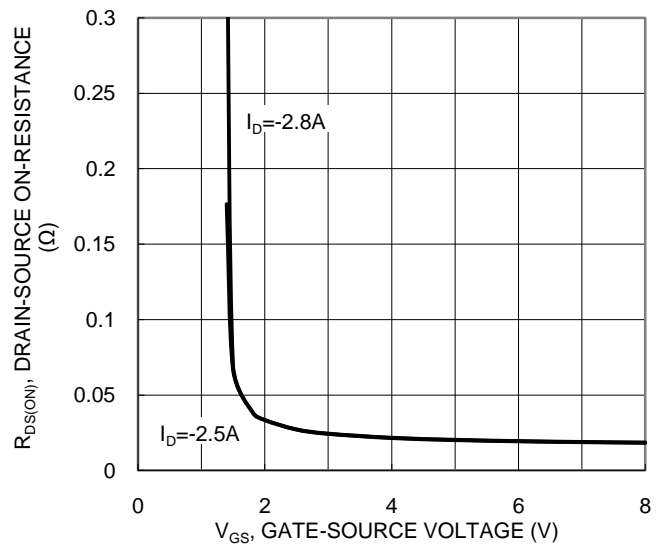


Figure 17. Typical Transfer Characteristic

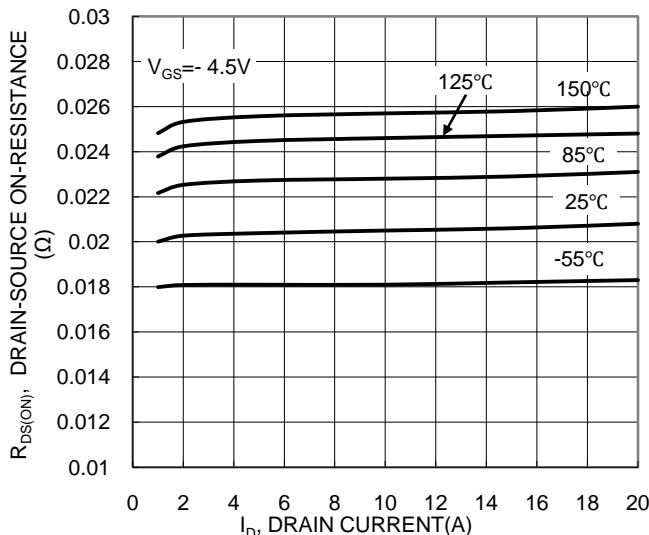


Figure 18. Typical On-Resistance vs. Drain Current and Temperature

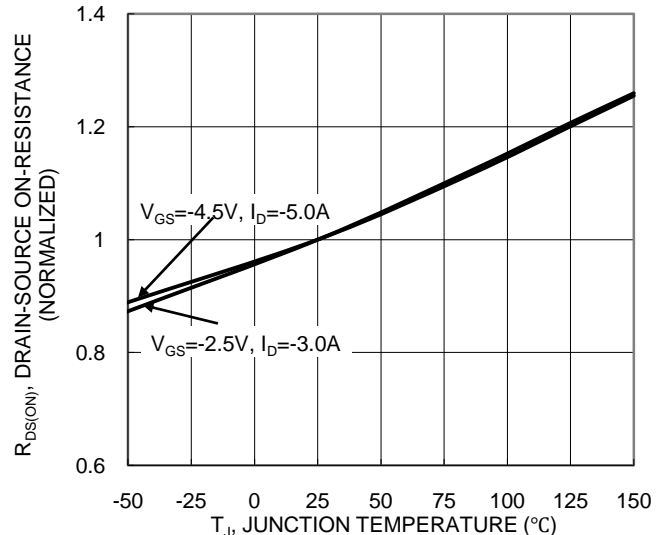


Figure 19. On-Resistance Variation with Temperature

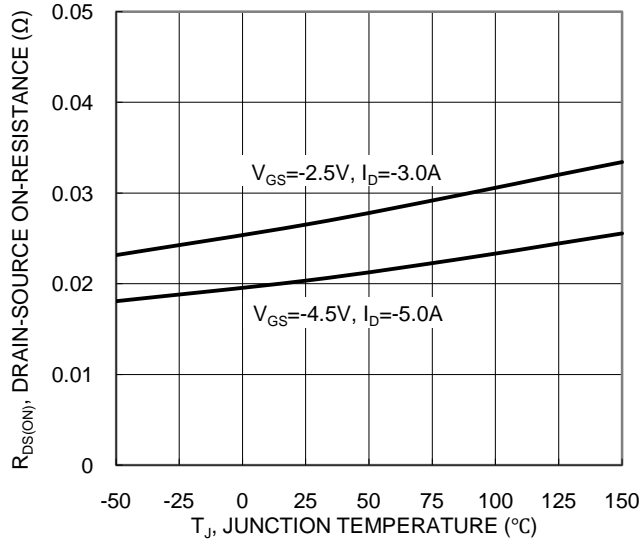


Figure 20. On-Resistance Variation with Temperature

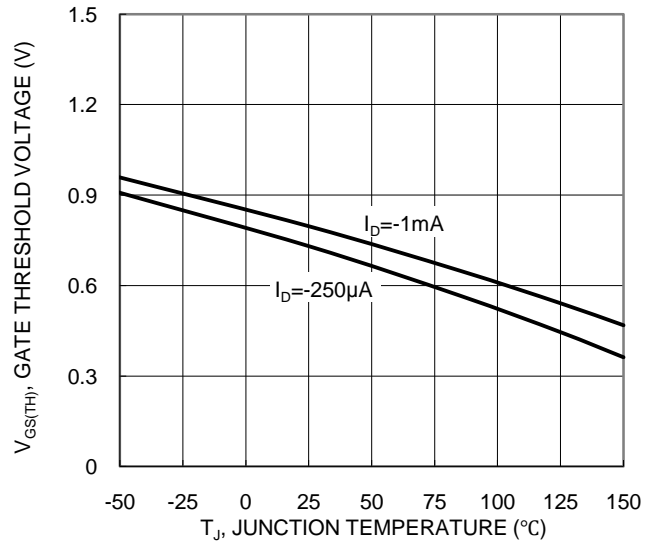


Figure 21. Gate Threshold Variation vs. Junction Temperature

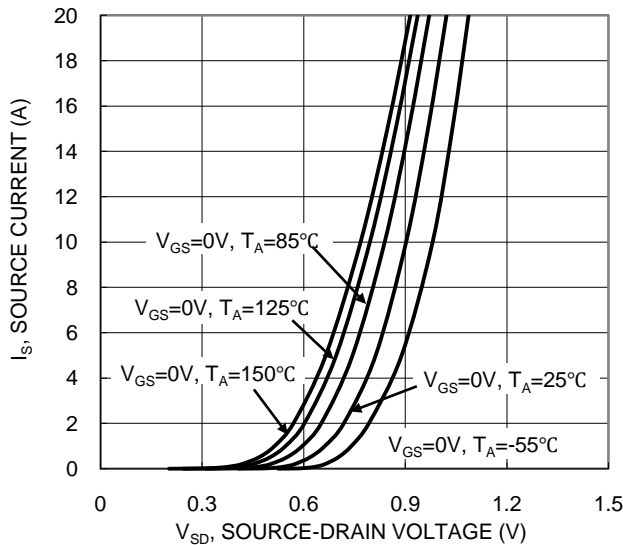


Figure 22. Diode Forward Voltage vs. Current

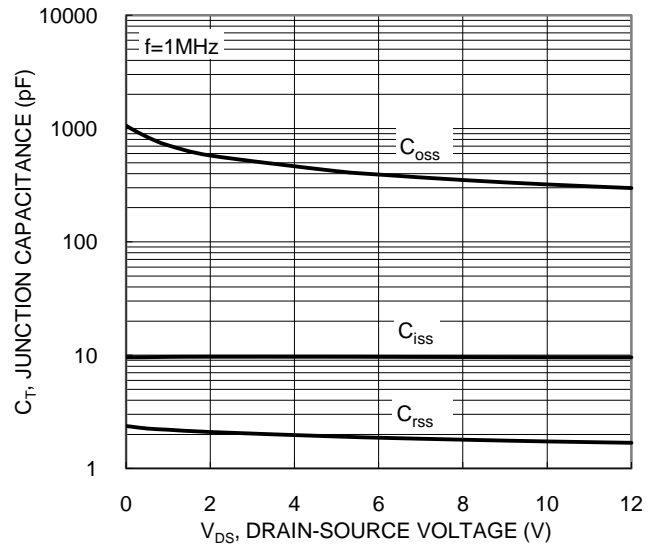


Figure 23. Typical Junction Capacitance

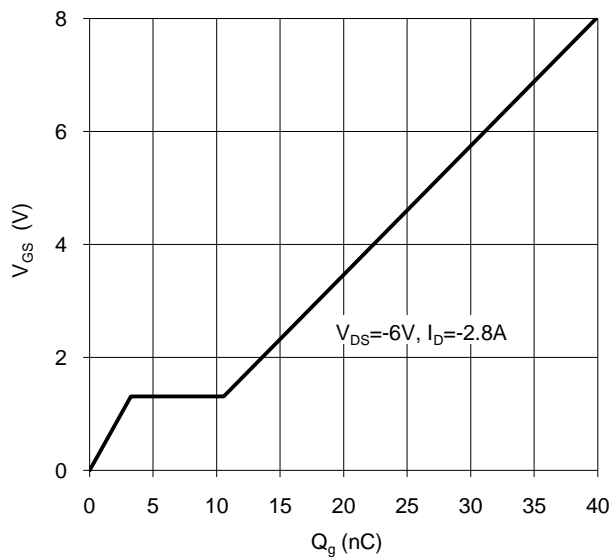


Figure 24. Gate Charge

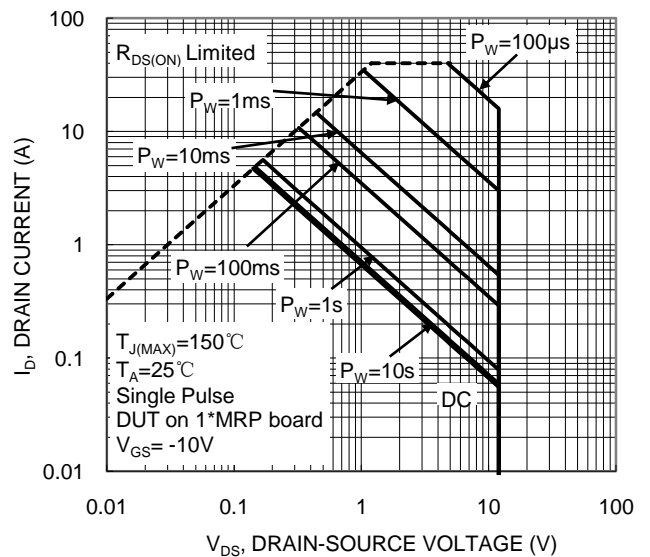
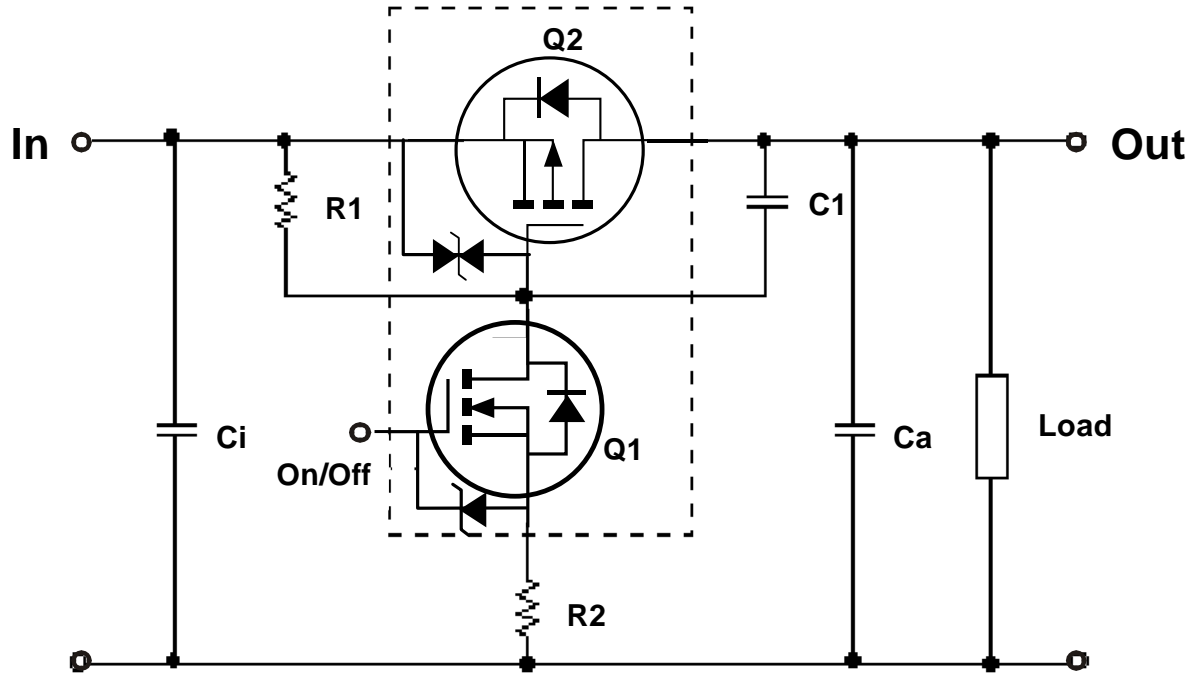


Figure 25. SOA, Safe Operation Area

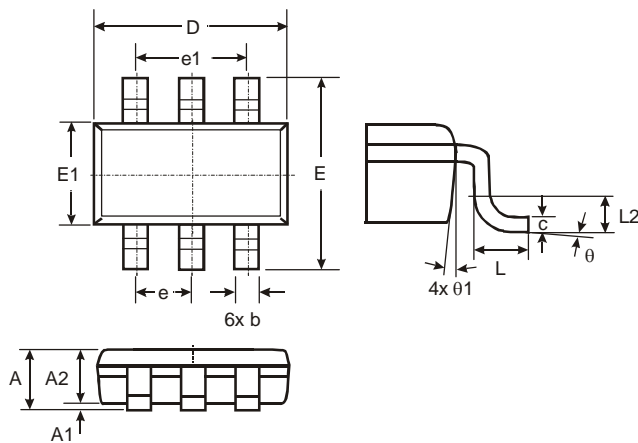
Application Circuit



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Package Outline Dimensions

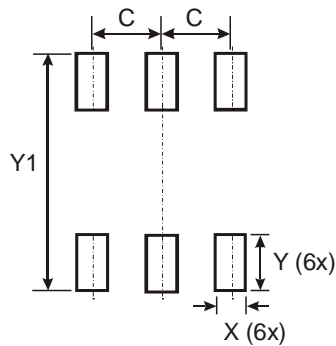
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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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