

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET
Product Summary

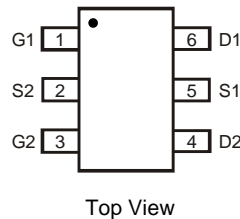
Device	BV_{DSS}	$R_{DS(ON) MAX}$	I_D $T_A = +25^\circ C$
N-Channel	20V	35m Ω @ $V_{GS} = 4.5V$	4.6A
		43m Ω @ $V_{GS} = 2.5V$	4.2A
P-Channel	-20V	74m Ω @ $V_{GS} = -4.5V$	-3.2A
		110m Ω @ $V_{GS} = -2.5V$	-2.7A

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

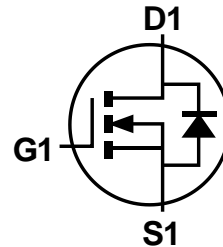
- Backlighting
- DC-DC Converters
- Power Management Functions


Features and Benefits

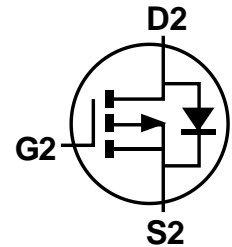
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMC2053UVTQ is suitable for automotive applications requiring specific change control and is AEC-Q101 qualified, is PPAP capable, and is manufactured in IATF16949:2016 certified facilities.**

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
- Weight: 0.013 grams (Approximate)



Q1 N-Channel MOSFET

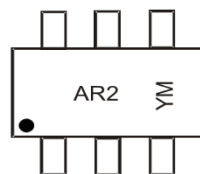


Q2 P-Channel MOSFET

Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2053UVTQ-7	TSOT26	3000 / Tape & Reel
DMC2053UVTQ-13	TSOT26	10000 / Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. 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.
 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information


AR2 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: G = 2019)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2019	2020	2021	2022	2023	2024	2025	2026				
Code	G	H	I	J	K	L	M	N				
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 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Q1 Value	Q2 Value	Unit	
Drain-Source Voltage	V _{DSS}	20	-20	V	
Gate-Source Voltage	V _{GSS}	±12	±12	V	
Continuous Drain Current (Note 6) N-Channel: V _{GS} = 4.5V P-Channel: V _{GS} = -4.5V	I _D	T _A = +25°C Steady State	4.6	-3.2	A
		T _A = +70°C	3.7	-2.6	
Maximum Continuous Body Diode Forward Current (Note 6)	I _S	1.4	-1.3	A	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)	I _{DM}	22	-20	A	

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P _D	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	R _{θJA}	173	°C/W
Total Power Dissipation (Note 6)	P _D	1.1	W
Thermal Resistance, Junction to Ambient (Note 6)	R _{θJA}	108	°C/W
Thermal Resistance, Junction to Case	R _{θJC}	37	
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Electrical Characteristics Q1 N-CHANNEL (@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}	20	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1.0	µA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	0.4	—	1.0	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	35	mΩ	V _{GS} = 4.5V, I _D = 5.0A
		—	—	43		V _{GS} = 2.5V, I _D = 4.0A
		—	—	56		V _{GS} = 1.8V, I _D = 2.0A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	369	—	pF	V _{DS} = 10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	54	—		
Reverse Transfer Capacitance	C _{rss}	—	32	—		
Gate Resistance	R _g	—	4.1	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _g	—	3.6	—	nC	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 6A
Gate-Source Charge	Q _{gs}	—	0.4	—		
Gate-Drain Charge	Q _{gd}	—	1.0	—		
Turn-On Delay Time	t _{D(ON)}	—	2.6	—	ns	V _{DS} = 10V, V _{GS} = 5V, R _G = 6Ω, I _D = 6A
Turn-On Rise Time	t _R	—	3.0	—		
Turn-Off Delay Time	t _{D(OFF)}	—	12.5	—		
Turn-Off Fall Time	t _F	—	3.6	—		
Reverse Recovery Time	t _{RR}	—	6.0	—	ns	I _F = 1A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	0.9	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

Electrical Characteristics Q2 P-CHANNEL (@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}	-20	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1.0	μA	V _{DS} = -20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±12V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(TH)}	-0.45	—	-1.0	V	V _{DS} = V _{GS} , I _D = -250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	—	74	mΩ	V _{GS} = -4.5V, I _D = -3.5A
				110		V _{GS} = -2.5V, I _D = -3.0A
				168		V _{GS} = -1.8V, I _D = -2.0A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C _{iss}	—	440	—	pF	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	60	—		
Reverse Transfer Capacitance	C _{rss}	—	48	—		
Gate Resistance	R _g	—	8.5	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	5.9	—	nC	V _{DS} = -4V, I _D = -3.5A
Gate-Source Charge	Q _{gs}	—	0.6	—		
Gate-Drain Charge	Q _{gd}	—	2.1	—		
Turn-On Delay Time	t _{D(ON)}	—	3.2	—	ns	V _{GS} = -4.5V, V _{DS} = -4V, R _G = 6Ω, R _L = 4Ω
Turn-On Rise Time	t _R	—	7.8	—		
Turn-Off Delay Time	t _{D(OFF)}	—	31	—		
Turn-Off Fall Time	t _F	—	18	—		
Reverse Recovery Time	t _{RR}	—	10.5	—	ns	I _F = -2.0A, di/dt = -100A/μs
Reverse Recovery Charge	Q _{RR}	—	3.0	—	nC	I _F = -2.0A, di/dt = -100A/μs

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

Typical Characteristics - N-CHANNEL

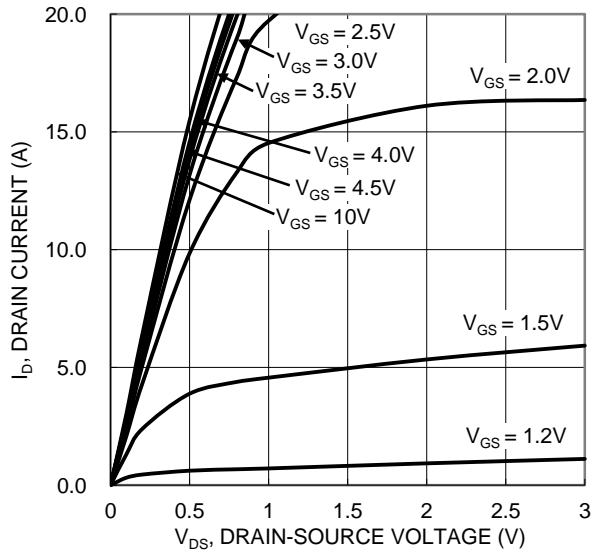


Figure 1. Typical Output Characteristic

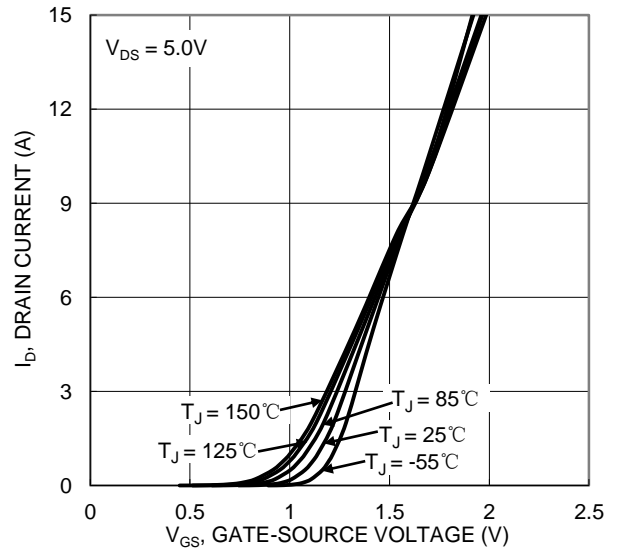


Figure 2. Typical Transfer Characteristic

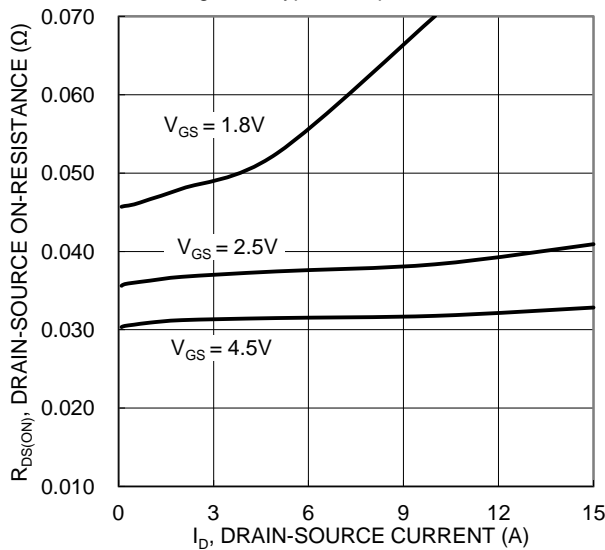


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

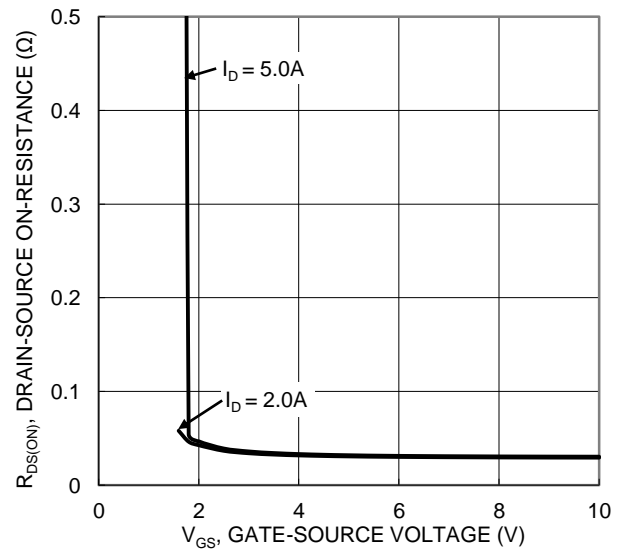


Figure 4. Typical Transfer Characteristic

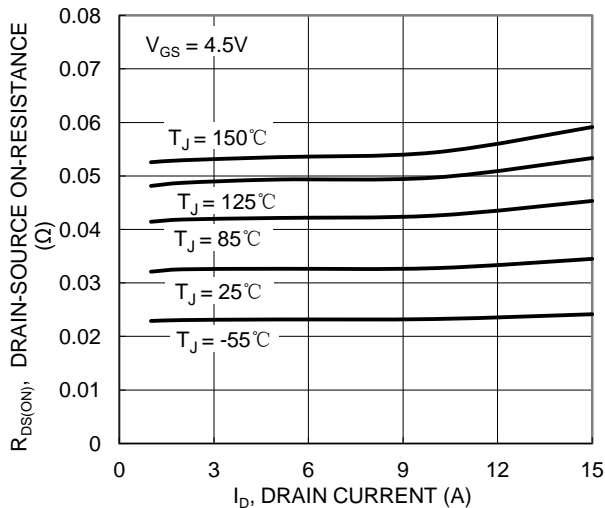


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

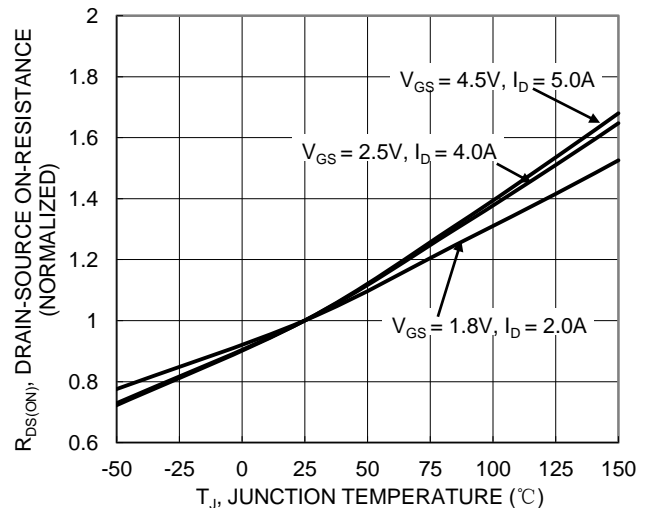


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (continued)

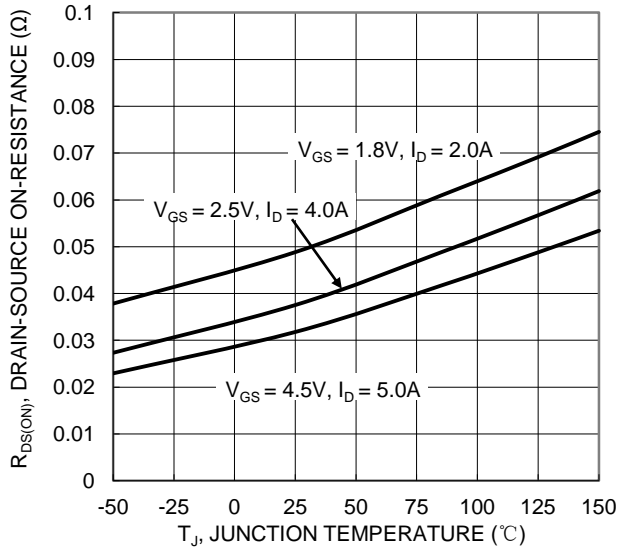


Figure 7. On-Resistance Variation with Temperature

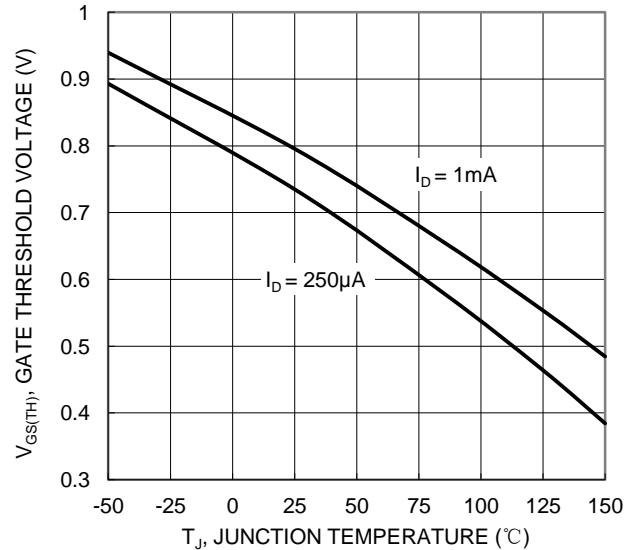


Figure 8. Gate Threshold Variation vs. Junction Temperature

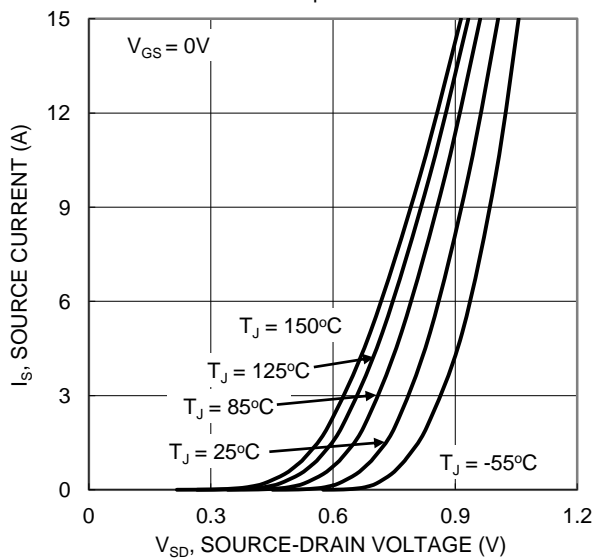


Figure 9. Diode Forward Voltage vs. Current

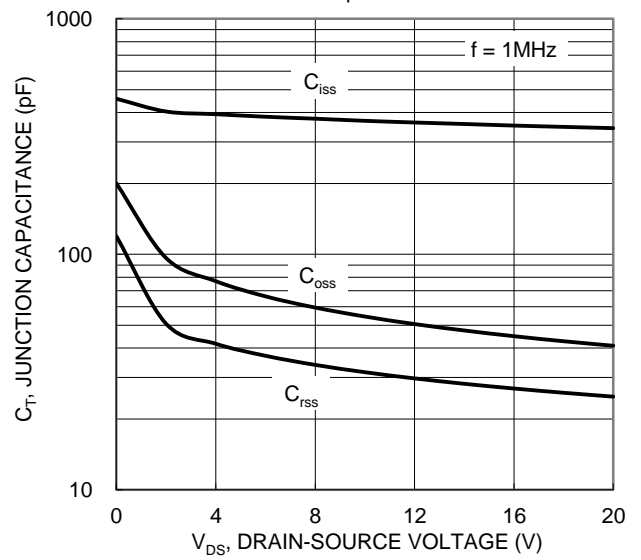


Figure 10. Typical Junction Capacitance

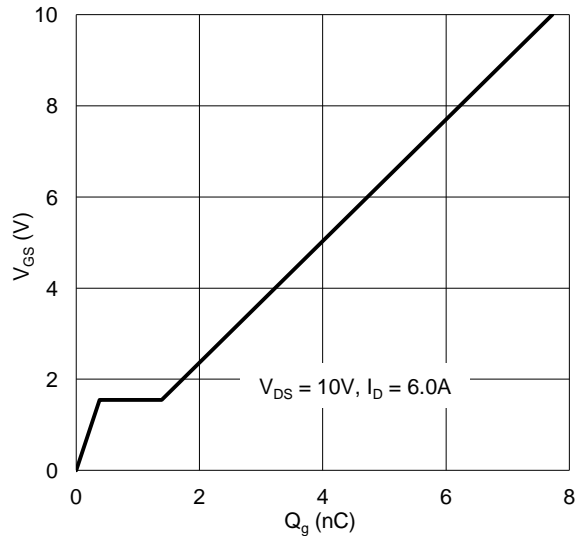


Figure 11. Gate Charge

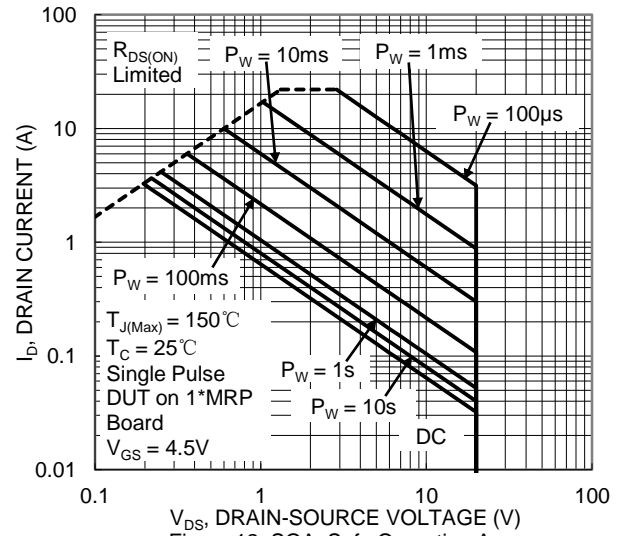


Figure 12. SOA, Safe Operation Area

Typical Characteristics - P-CHANNEL

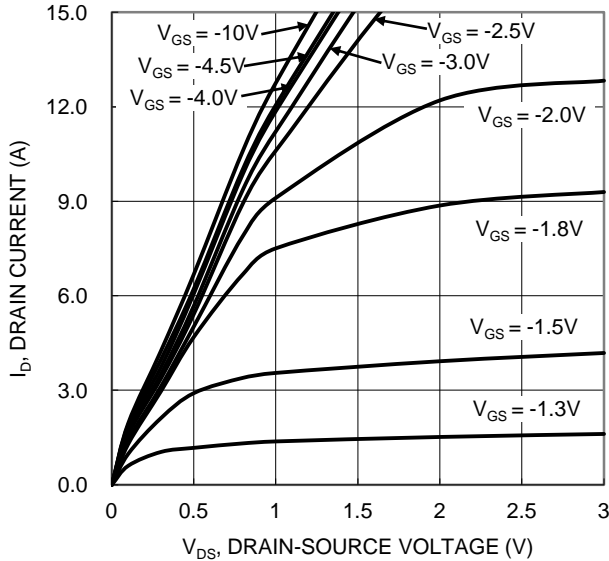


Figure 13. Typical Output Characteristic

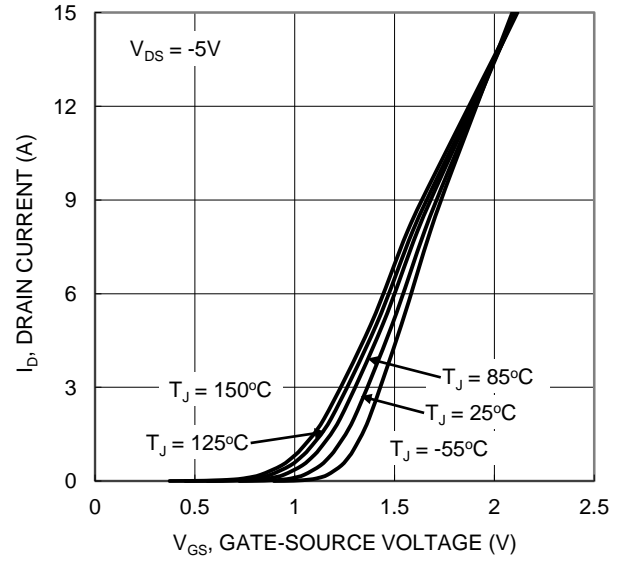


Figure 14. Typical Transfer Characteristic

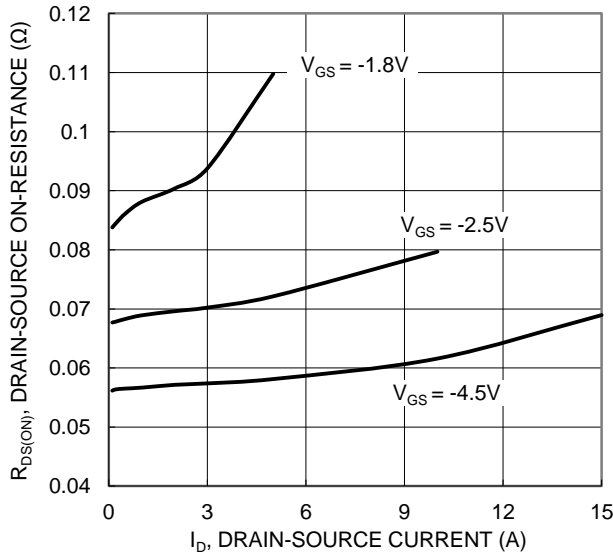


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

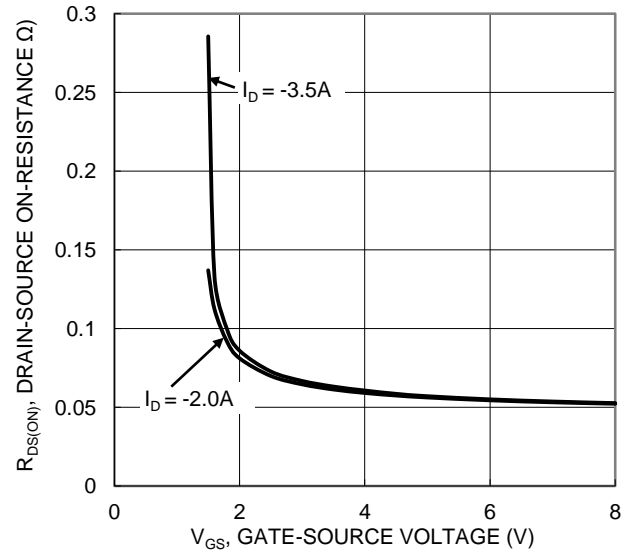


Figure 16. Typical Transfer Characteristic

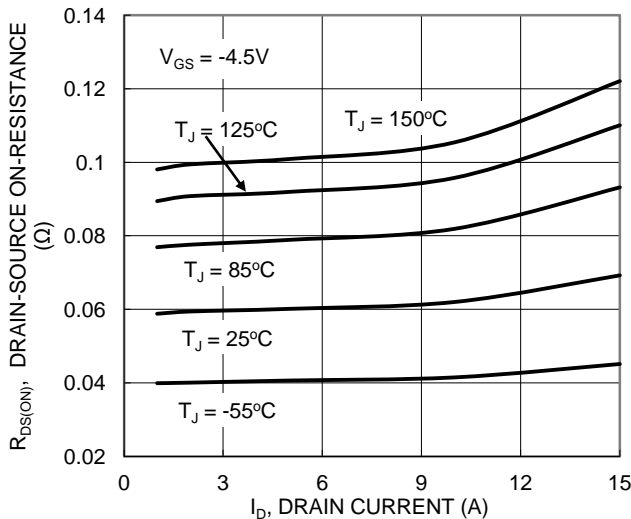


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

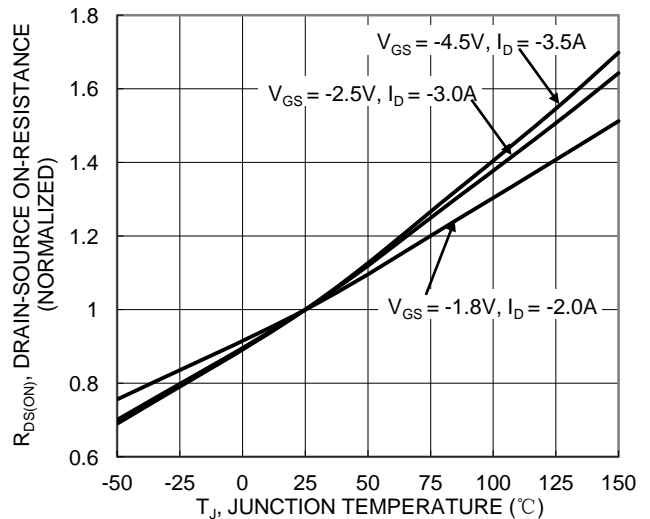


Figure 18. On-Resistance Variation with Junction Temperature

Typical Characteristics - P-CHANNEL (continued)

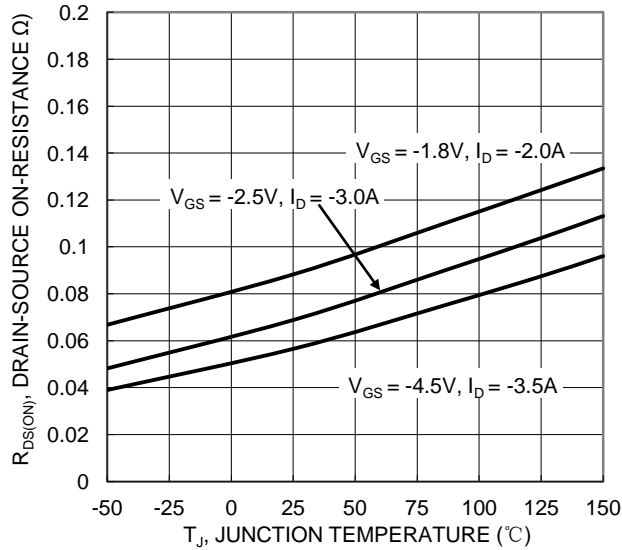


Figure 19. On-Resistance Variation with Junction Temperature

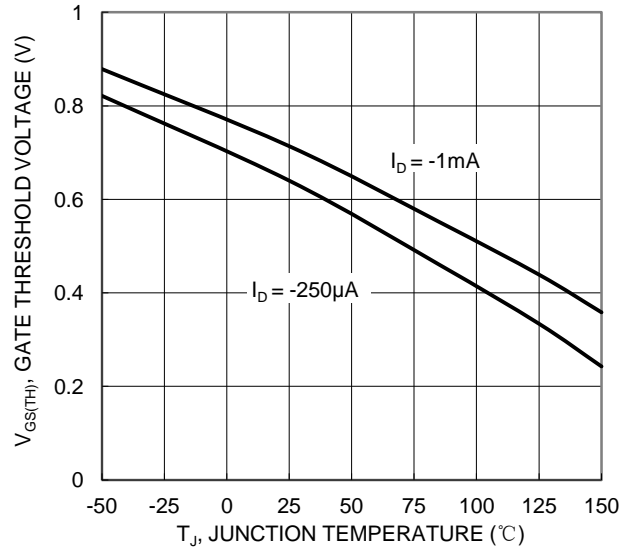


Figure 20. Gate Threshold Variation vs. Junction Temperature

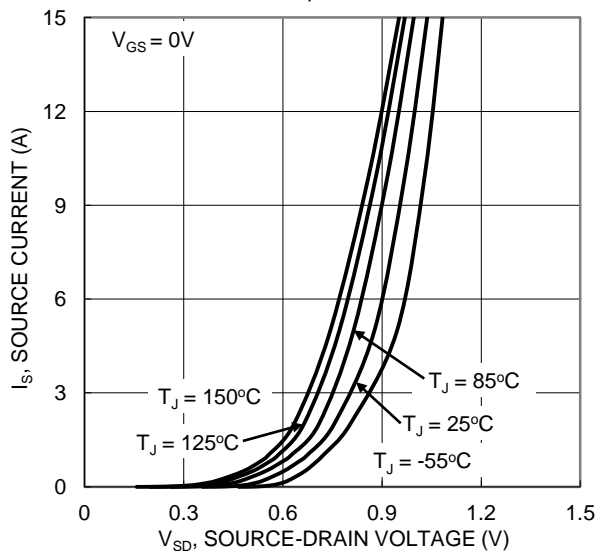


Figure 21. Diode Forward Voltage vs. Current

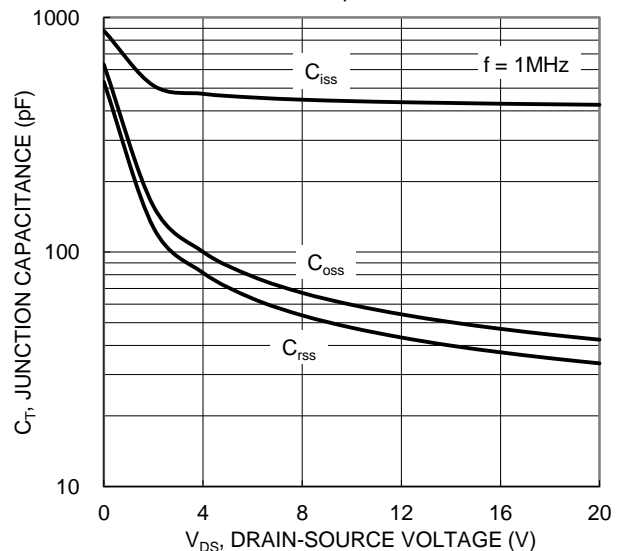


Figure 22. Typical Junction Capacitance

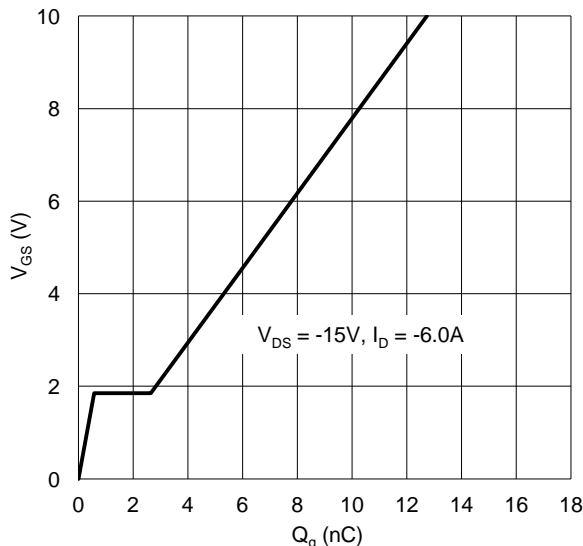


Figure 23. Gate Charge

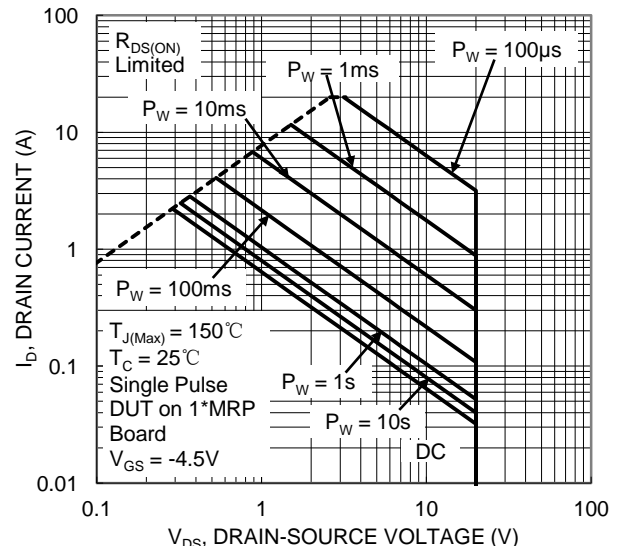


Figure 24. SOA, Safe Operation Area

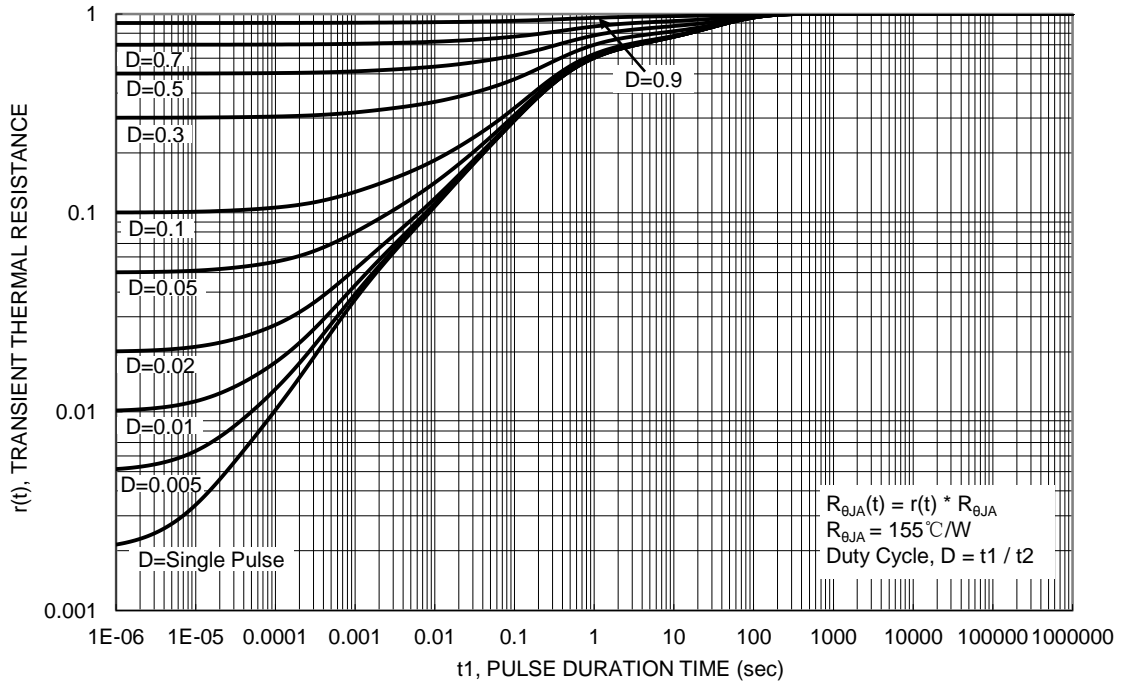
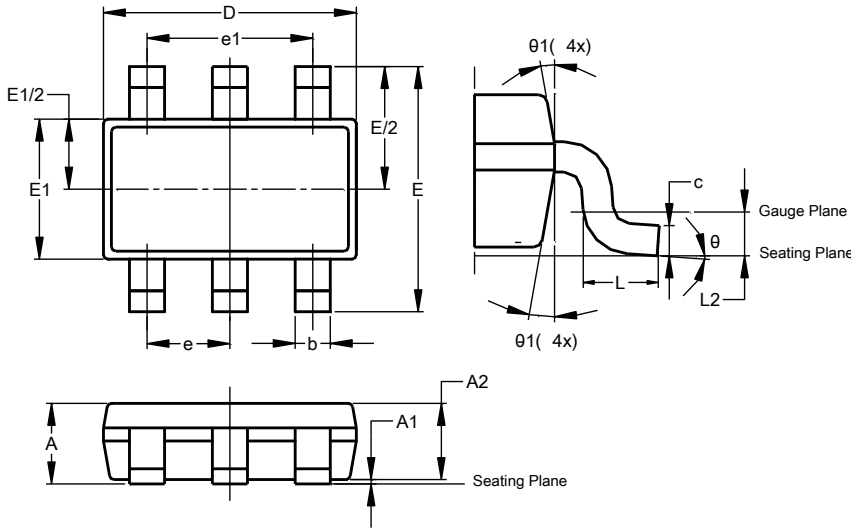


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

TSOT26

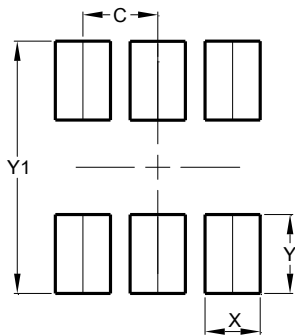


TSOT26			
Dim	Min	Max	Typ
A	-	1.00	-
A1	0.010	0.100	-
A2	0.840	0.900	-
D	2.800	3.000	2.900
E	2.800 BSC		
E1	1.500	1.700	1.600
b	0.300	0.450	-
c	0.120	0.200	-
e	0.950 BSC		
e1	1.900 BSC		
L	0.30	0.50	-
L2	0.250 BSC		
θ	0°	8°	4°
θ_1	4°	12°	-
All Dimensions in mm			

Suggested Pad Layout

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

TSOT26



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

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