

COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	BV_{DSS}	$R_{DS(ON)}$	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

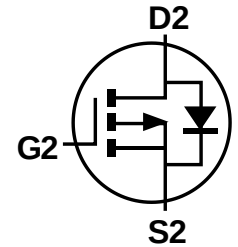
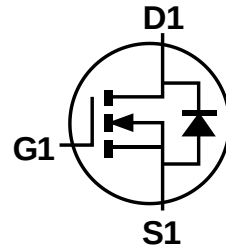
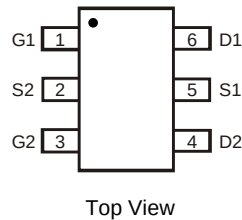
- Backlighting
- DC-DC Converters
- Power Management Functions

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)**

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@3
- Weight: 0.013 grams (Approximate)

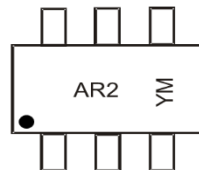


Ordering Information (Note 4)

Part Number	Case	Packaging
DMC2053UVT-7	TSOT26	3000 / Tape & Reel
DMC2053UVT-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: F = 2018)
M or $\bar{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2017	2018	2019	2020	2021	2022	2023	2024
Code	E	F	G	H	I	J	K	L

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) V _{GS} = 4.5V	Steady State	T _A = +25°C	I _D	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)	T _A = +25°C	P _D	0.7	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	173	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.1	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	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:
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 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
				—		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

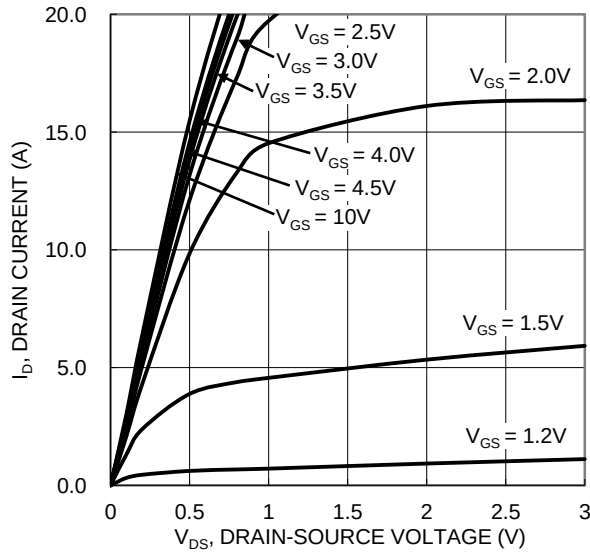


Figure 1. Typical Output Characteristic

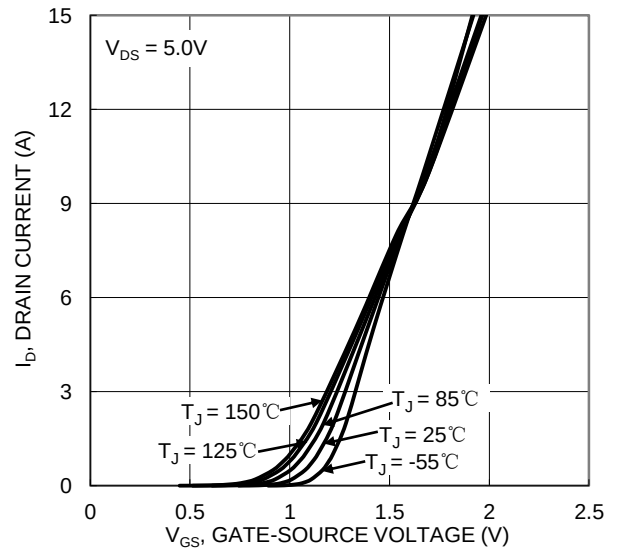


Figure 2. Typical Transfer Characteristic

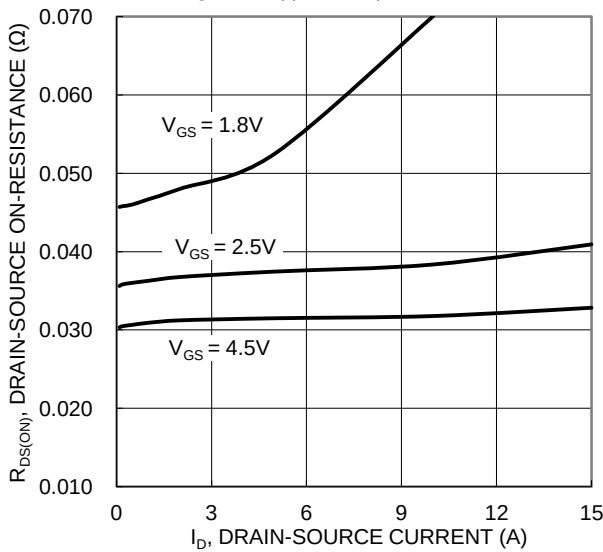


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

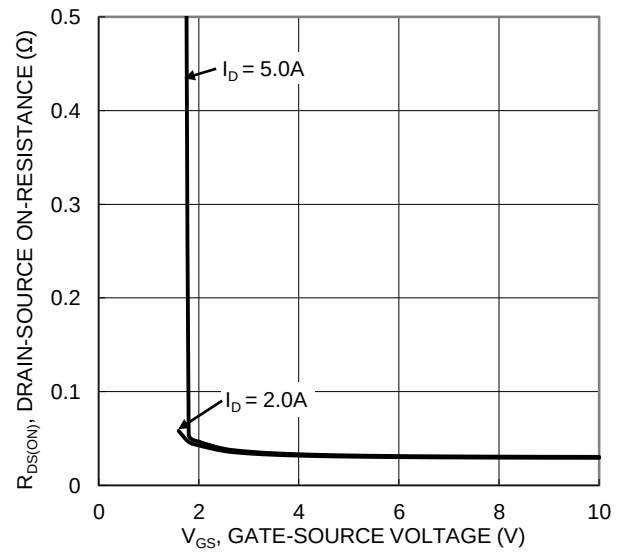


Figure 4. Typical Transfer Characteristic

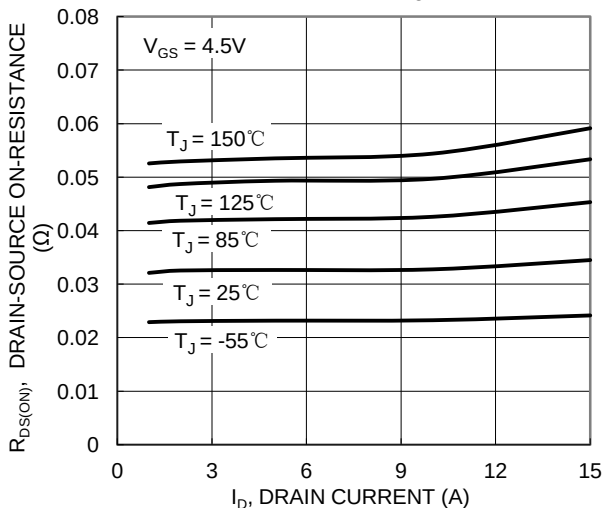


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

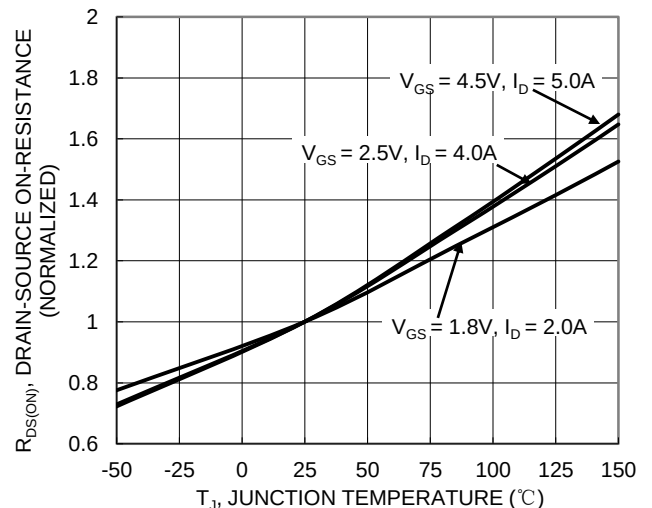
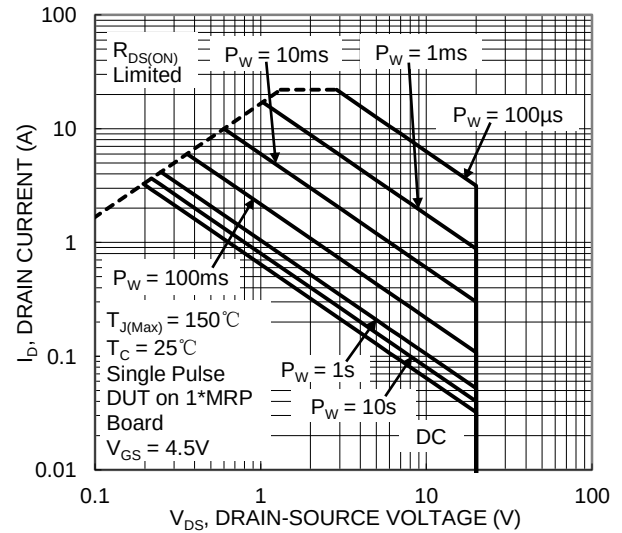
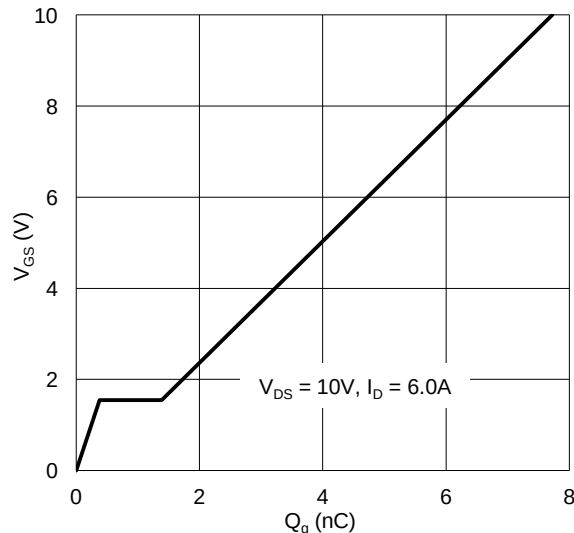
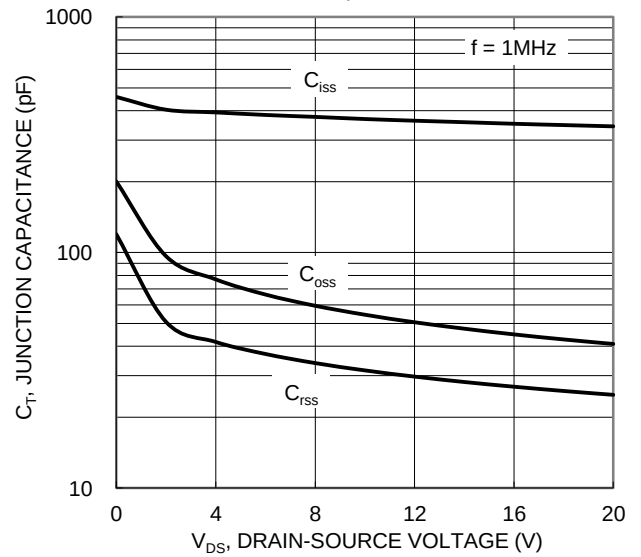
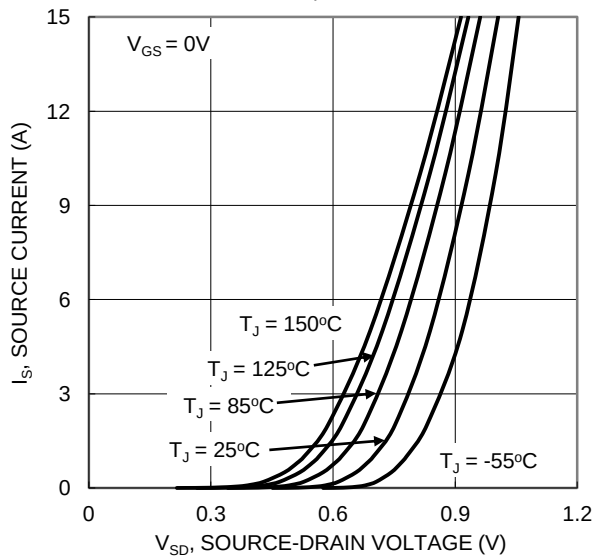
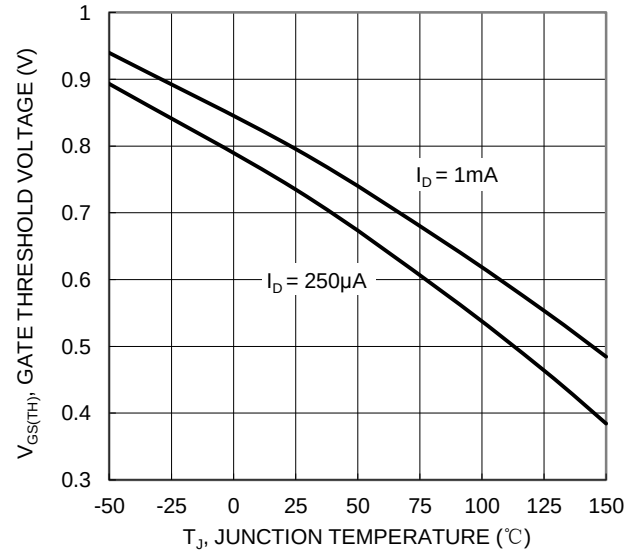
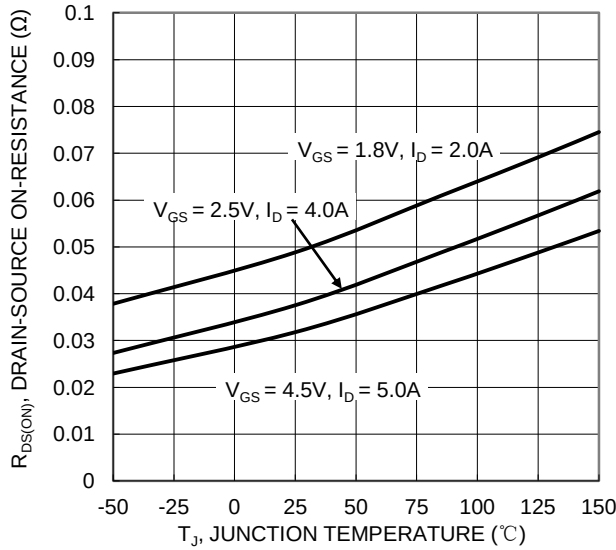


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - N-CHANNEL (Cont.)



Typical Characteristics - P-CHANNEL

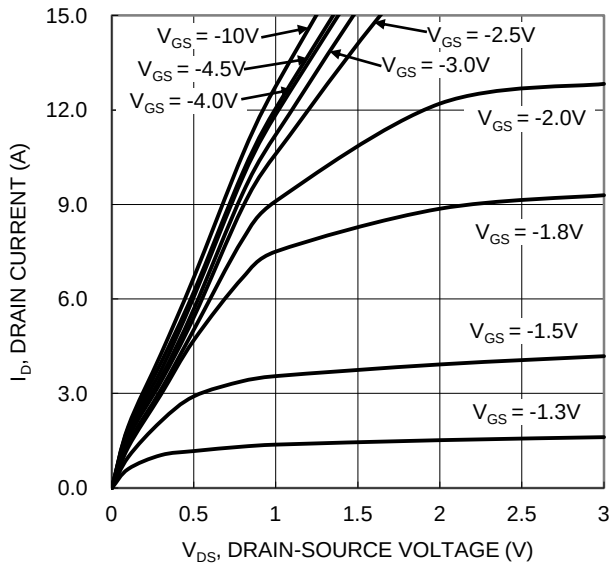


Figure 13. Typical Output Characteristic

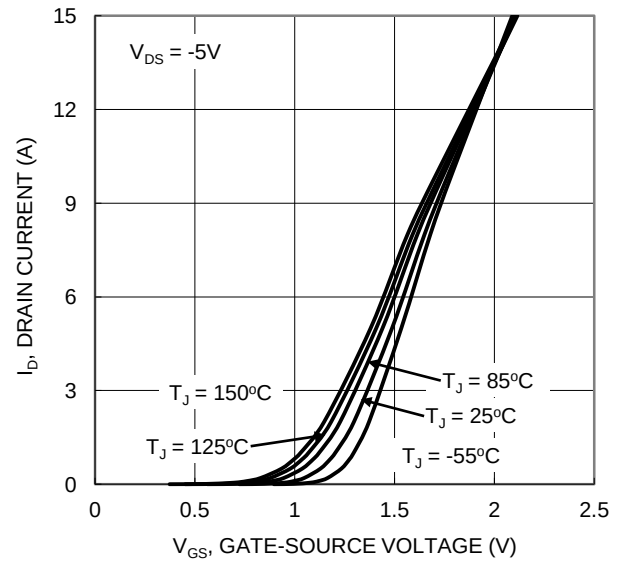


Figure 14. Typical Transfer Characteristic

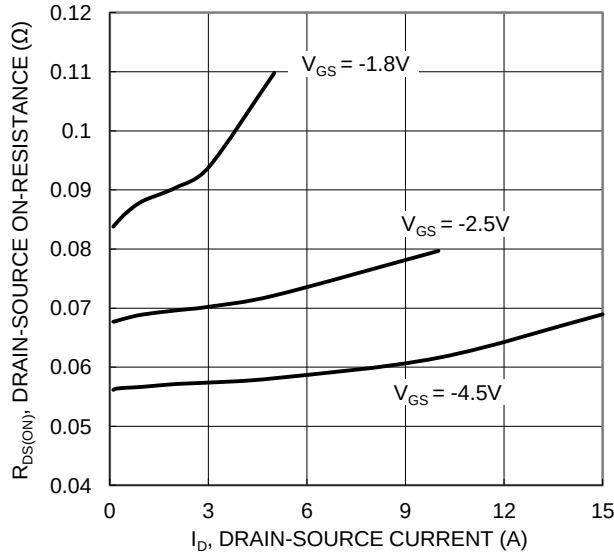


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

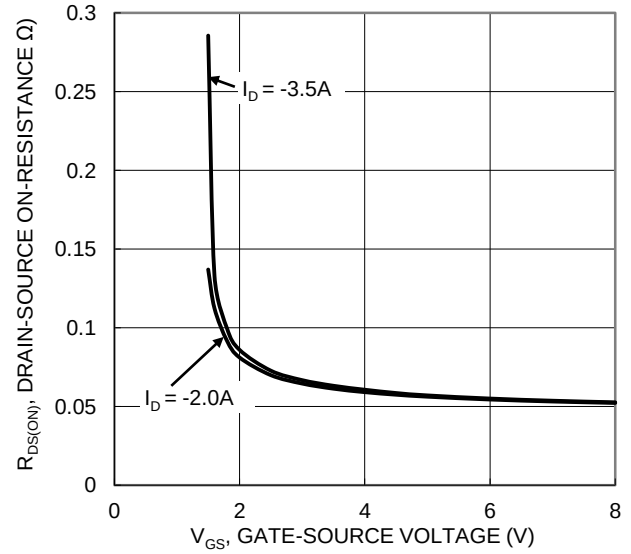


Figure 16. Typical Transfer Characteristic

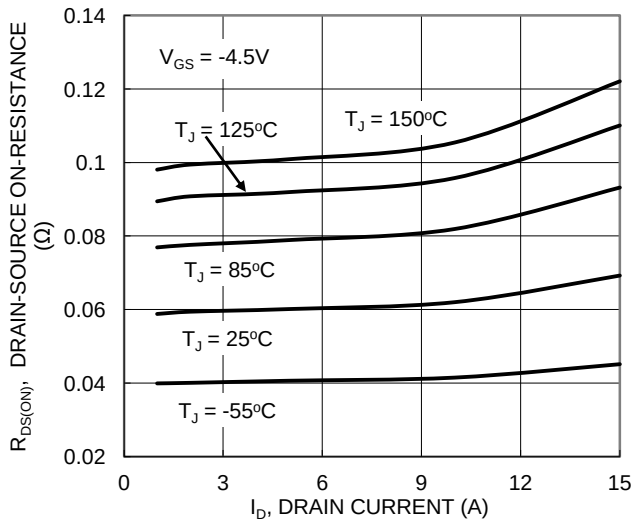


Figure 17. Typical On-Resistance vs. Drain Current and Junction Temperature

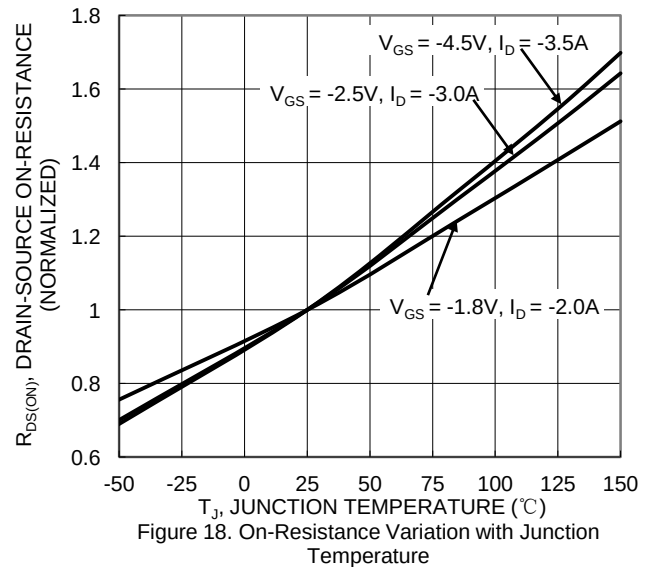
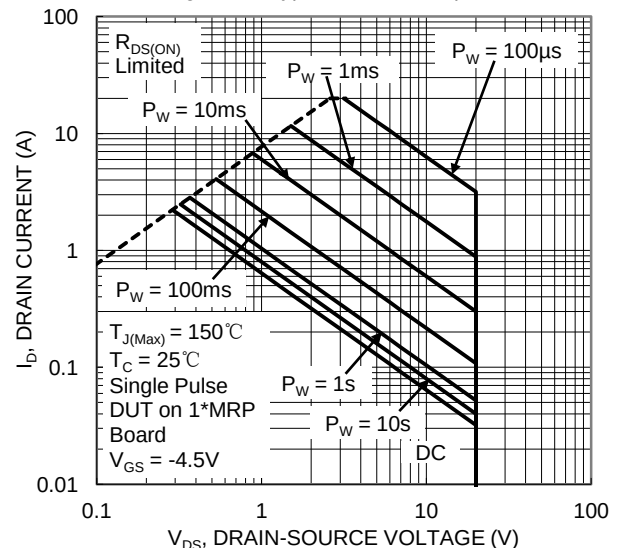
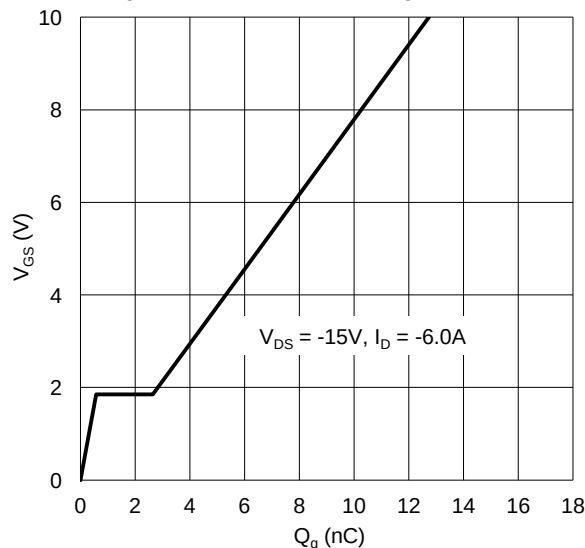
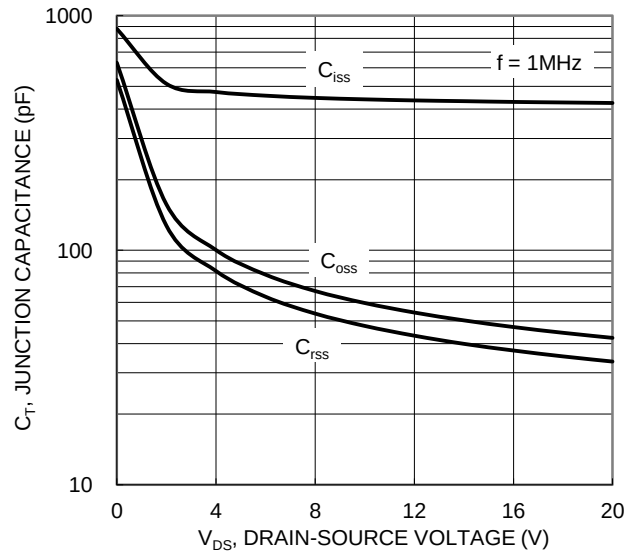
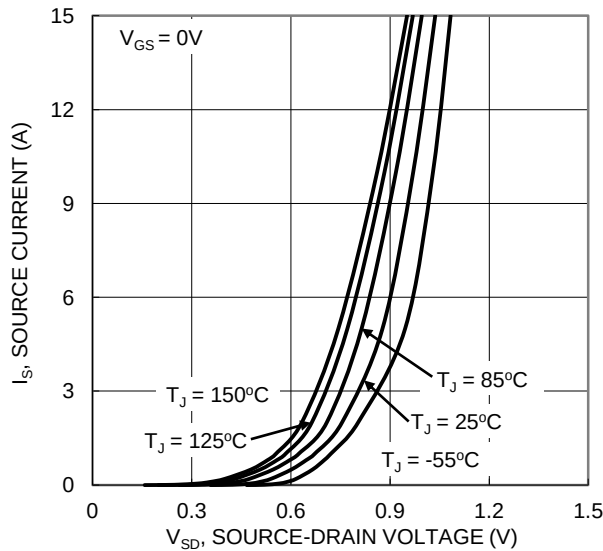
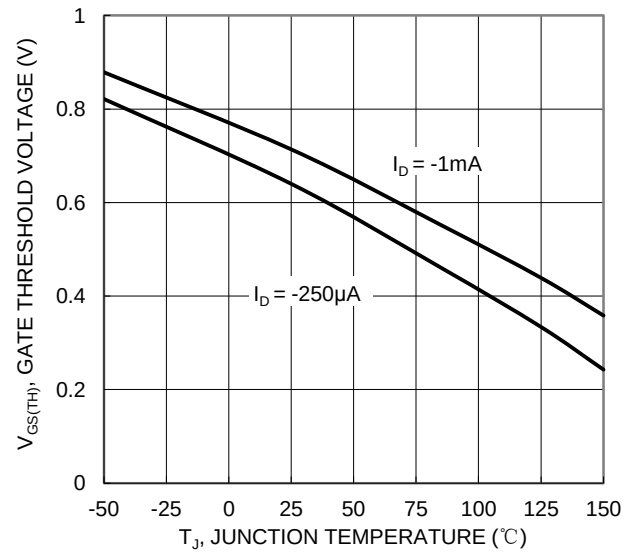
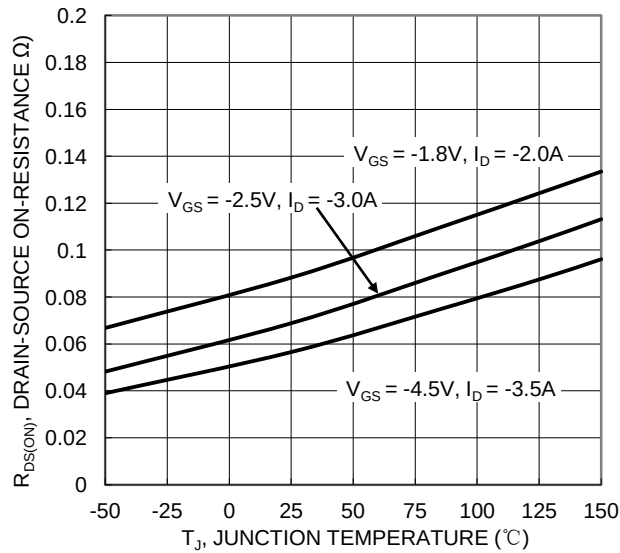


Figure 18. On-Resistance Variation with Junction Temperature

Typical Characteristics - P-CHANNEL (Cont.)



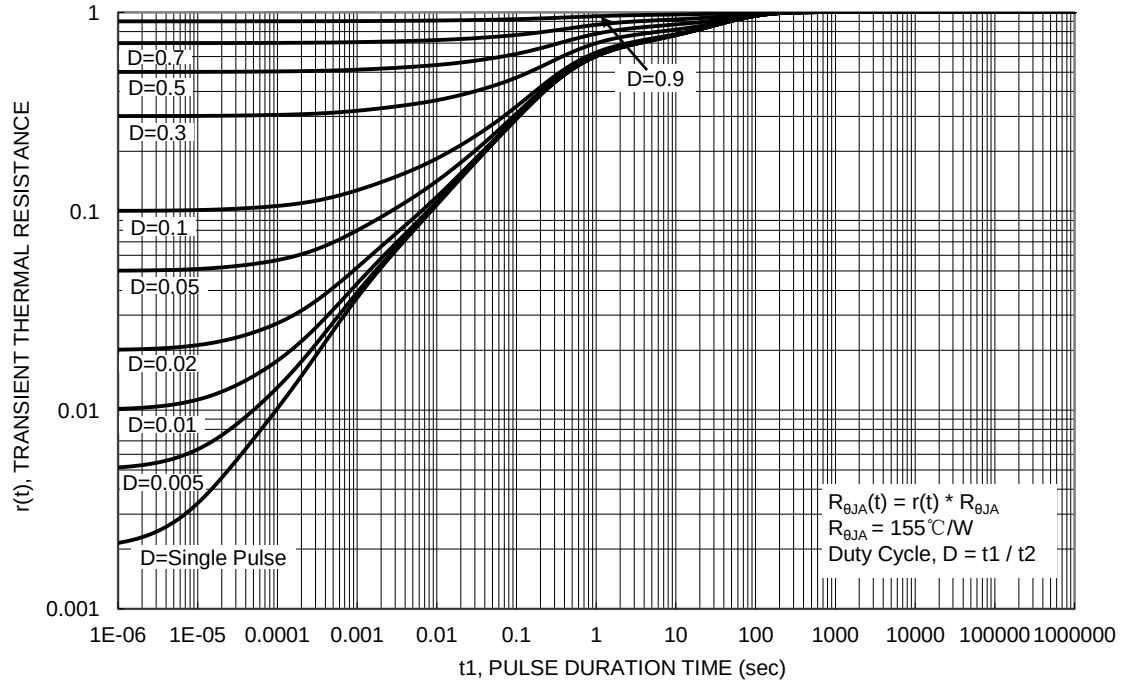
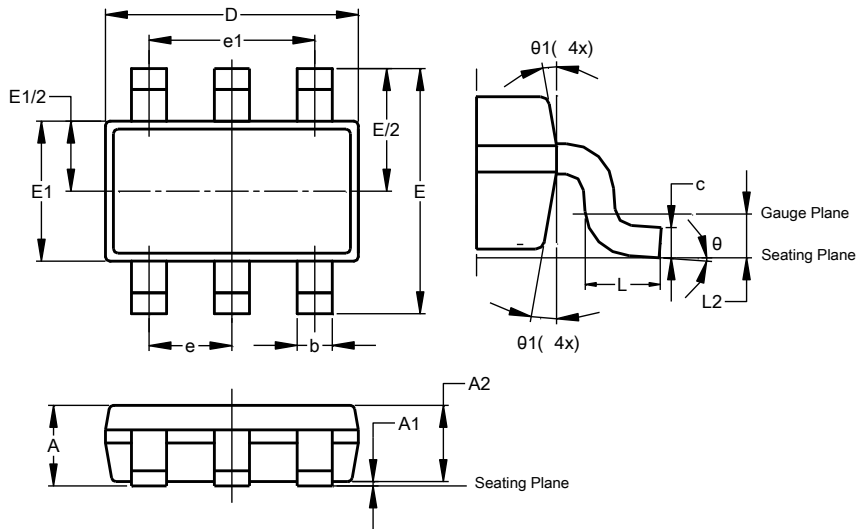


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

TSOT26

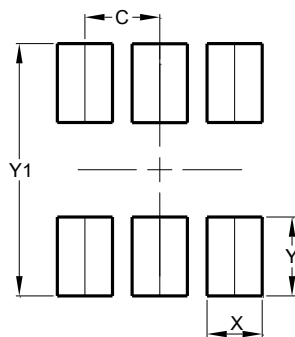


TSOT26			
Dim	Min	Max	Typ
A	–	1.00	–
A1	0.010	0.100	–
A2	0.840	0.900	–
D	2.800	3.000	2.900
E	2.800 BSC		
E1	1.500	1.700	1.600
b	0.300	0.450	–
c	0.120	0.200	–
e	0.950 BSC		
e1	1.900 BSC		
L	0.30	0.50	–
L2	0.250 BSC		
θ	0°	8°	4°
$\theta 1$	4°	12°	–
All Dimensions in mm			

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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