

Product Summary

Device	BV _{DSS}	R _{DS(ON)}	I _D T _C = +25°C
Q1	30V	11.1mΩ @ V _{GS} = 10V	35A
		14.0mΩ @ V _{GS} = 4.5V	27A
Q2	30V	6.0mΩ @ V _{GS} = 10V	50A
		10.0mΩ @ V _{GS} = 4.5V	35A

Description and Applications


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.

- Notebook Battery Power Management
- DC-DC Converters
- Loadswitch

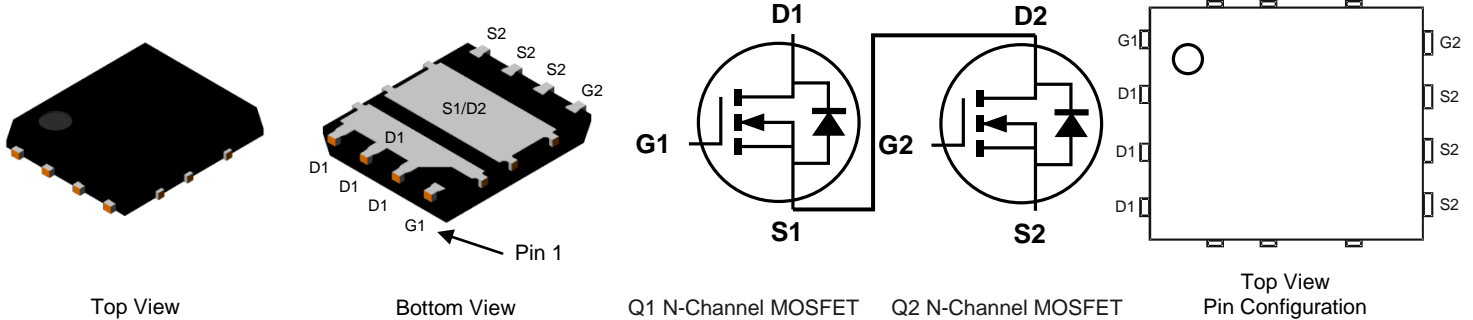
Features and Benefits

- Thermally Efficient Package-Cooler Running Applications
- High Conversion Efficiency
- Low R_{DS(ON)} – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: PowerDI[®] 5060-8 (Type S)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – 100% Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Terminal Connections: See Diagram Below
- Weight: 0.097 grams (Approximate)

PowerDI5060-8 (Type S)

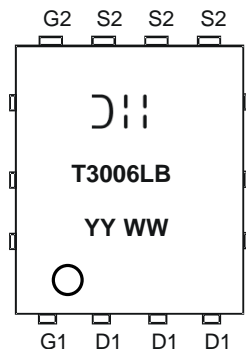


Ordering Information (Note 4)

Part Number	Case	Packaging
DMT3006LPB-13	PowerDI5060-8 (Type S)	2500 / 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



D11 = Manufacturer's Marking
T3006LB = Product Type Marking Code
YYWW = Date Code Marking
YY = Year (ex: 18 = 2018)
WW = Week (01 to 53)

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

Characteristic			Symbol	Q1 Value	Q2 Value	Unit
Drain-Source Voltage			V _{DSS}	30	30	V
Gate-Source Voltage			V _{GSS}	±20	±20	V
Continuous Drain Current (Note 7) V _{GS} = 10V	Steady State	T _C = +25°C	I _D	35	50	A
		T _C = +70°C		27	40	
Continuous Drain Current (Note 6) V _{GS} = 10V	Steady State	T _A = +25°C	I _D	11	14	A
		T _A = +70°C		9	11	
Maximum Body Diode Forward Current (Note 7)			I _S	40	50	A
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)			I _{DM}	80	100	A
Pulsed Body Diode Forward Current (10μs Pulse, Duty Cycle = 1%)			I _{SM}	80	100	A
Avalanche Current (Note 8) L = 0.1mH			I _{AS}	19	23	A
Avalanche Energy (Note 8) L = 0.1mH			E _{AS}	18	28	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	1.1	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	116	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.7	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	72	°C/W
Total Power Dissipation (Note 7)		P _D	30	W
Thermal Resistance, Junction to Case (Note 7)		R _{θJC}	4	°C/W
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 9)						
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} = 20V, V _{DS} = 0V V _{GS} = -16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	6.7	11.1	mΩ	V _{GS} = 10V, I _D = 11.5A
		—	11.0	14.0		V _{GS} = 4.5V, I _D = 7A
Diode Forward Voltage	V _{SD}	—	0.8	1.2	V	V _{GS} = 0V, I _S = 10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	841	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	349	—		
Reverse Transfer Capacitance	C _{rss}	—	51	—		
Gate Resistance	R _G	—	1.2	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 10V)	Q _G	—	12.6	—	nC	V _{DS} = 15V, I _D = 14.4A
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	6.3	—		
Gate-Source Charge	Q _{GS}	—	1.7	—		
Gate-Drain Charge	Q _{GD}	—	3.1	—		
Turn-On Delay Time	t _{D(ON)}	—	4.6	—	ns	V _{GS} = 10V, V _{DD} = 15V, R _G = 1Ω, I _D = 10A
Turn-On Rise Time	t _R	—	3.3	—		
Turn-Off Delay Time	t _{D(OFF)}	—	10.2	—		
Turn-Off Fall Time	t _F	—	1.8	—		
Body Diode Reverse Recovery Time	t _{RR}	—	15.6	—	ns	I _F = 10A, di/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q _{RR}	—	5.8	—	nC	I _F = 10A, di/dt = 100A/μs

- 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.
 - Thermal resistance from junction to soldering point (on the exposed drain pad).
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
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} = +20V, V _{DS} = 0V V _{GS} = -16V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1.0	—	3.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	5.0	6.0	mΩ	V _{GS} = 10V, I _D = 20A
			7.5	10.0		V _{GS} = 4.5V, I _D = 10A
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _S = 2A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{iss}	—	1,155	—	pF	V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	456	—		
Reverse Transfer Capacitance	C _{rss}	—	72	—		
Gate Resistance	R _G	—	2.1	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = 10V)	Q _G	—	16.7	—	nC	V _{DD} = 15V, I _D = 9A
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	8.4	—		
Gate-Source Charge	Q _{GS}	—	2.2	—		
Gate-Drain Charge	Q _{GD}	—	3.5	—		
Turn-On Delay Time	t _{D(ON)}	—	3.5	—	ns	V _{DD} = 15V, V _{GS} = 10V, R _G = 3Ω, I _D = 9A
Turn-On Rise Time	t _R	—	5.5	—		
Turn-Off Delay Time	t _{D(OFF)}	—	13.5	—		
Turn-Off Fall Time	t _F	—	4.6	—		
Reverse Recovery Time	t _{RR}	—	19.3	—	ns	I _F = 1.5A, di/dt = 100A/μs
Reverse Recovery Charge	Q _{RR}	—	8.6	—	nC	

Notes: 9. Short duration pulse test used to minimize self-heating effect.
10. Guaranteed by design. Not subject to product testing.

Typical Characteristics - Q1 N-Channel

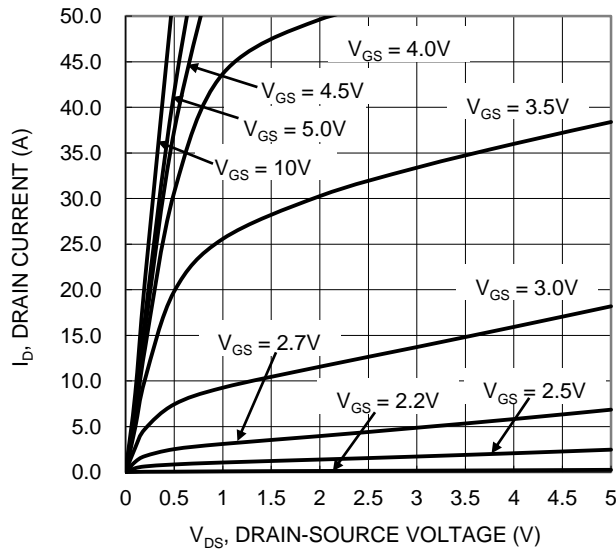


Figure 1. Typical Output Characteristic

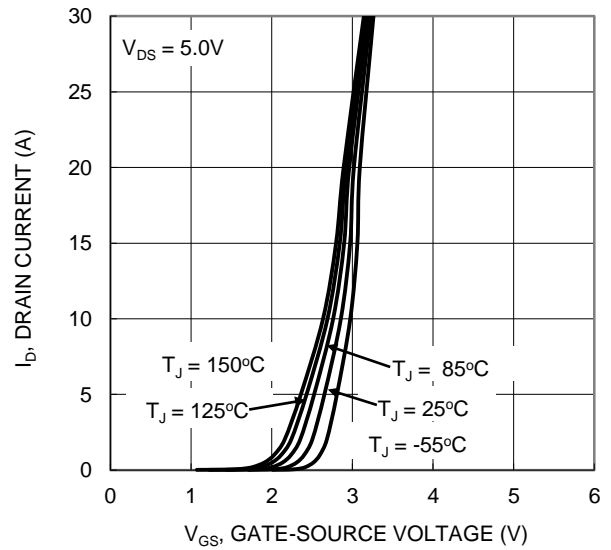


Figure 2. Typical Transfer Characteristic

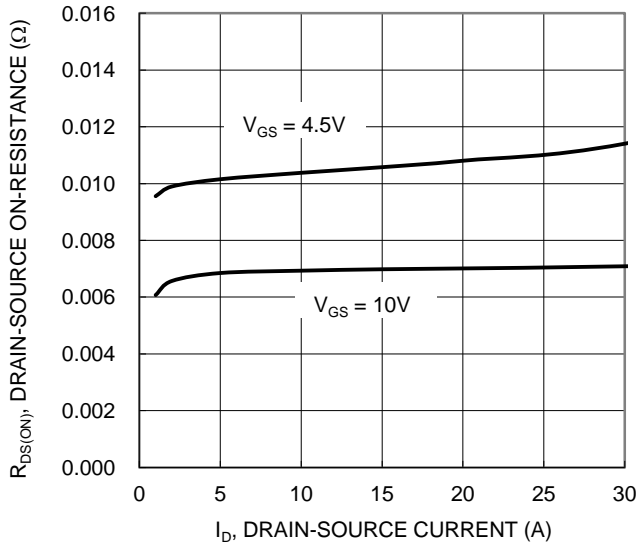


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

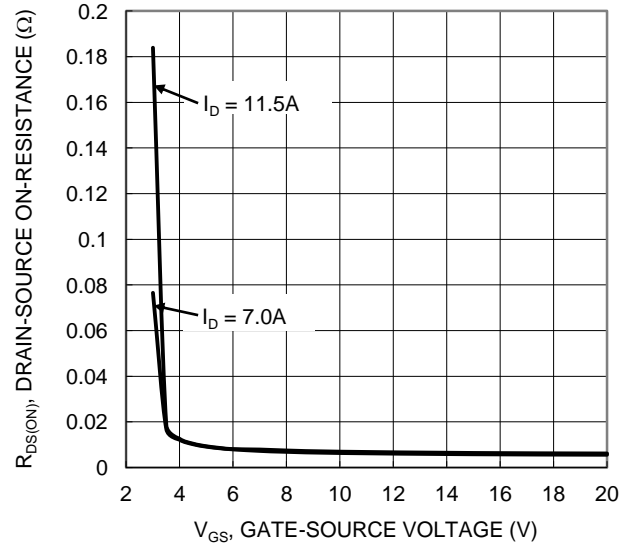


Figure 4. Typical Transfer Characteristic

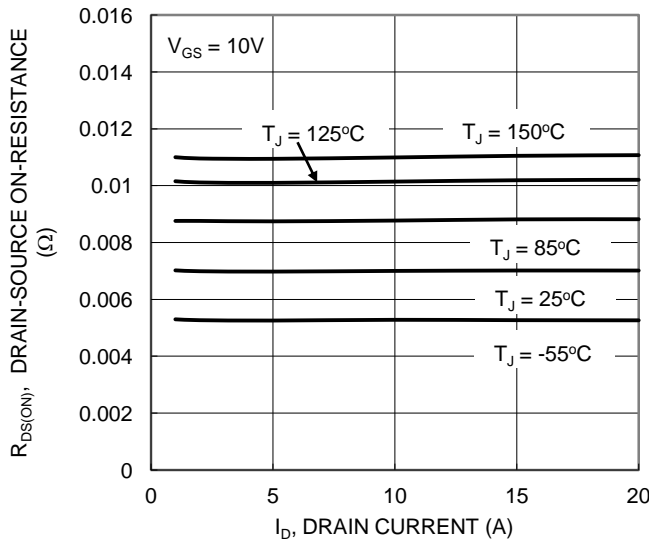


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

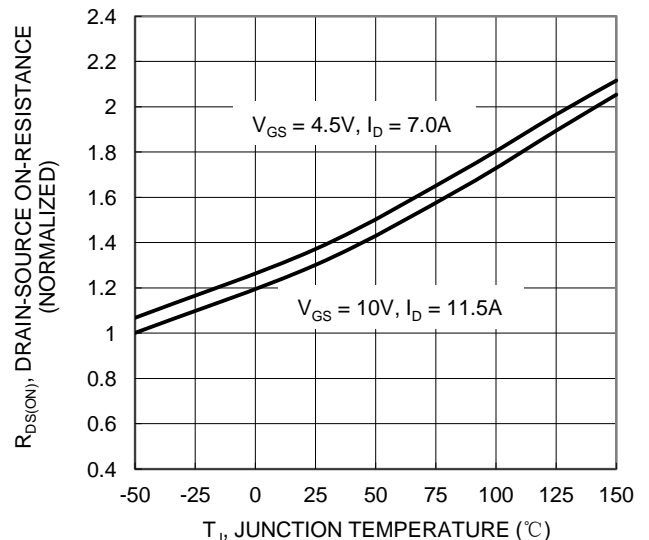
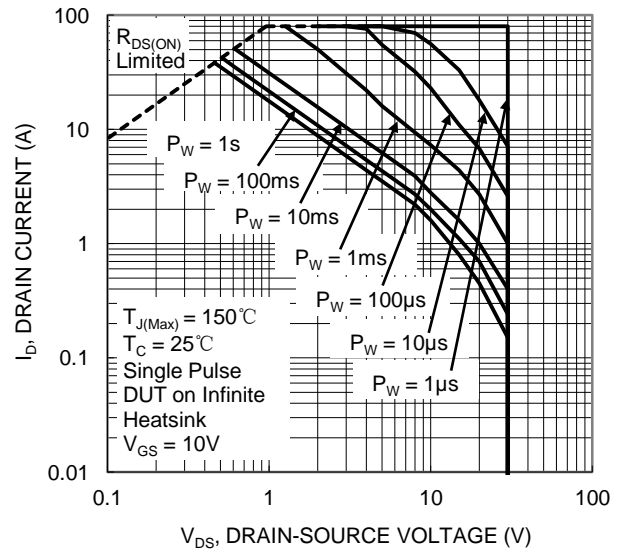
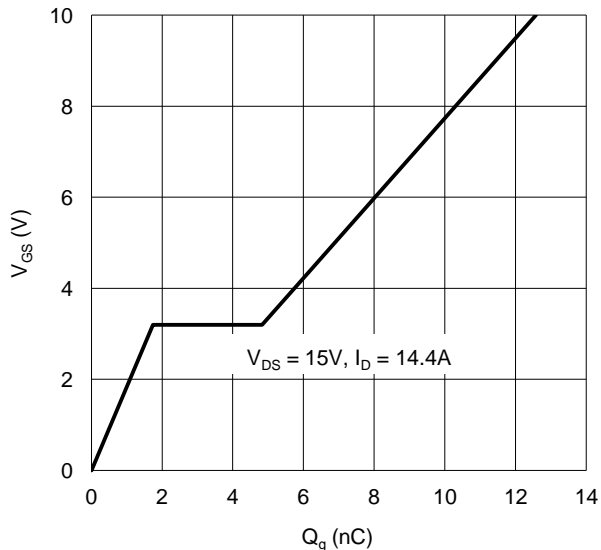
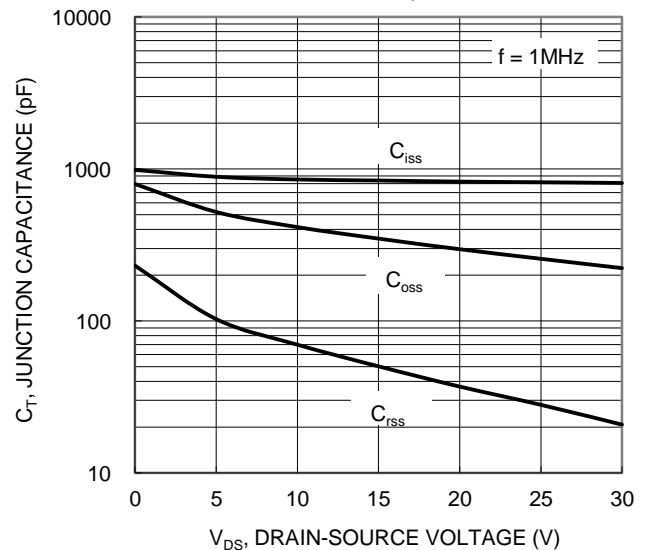
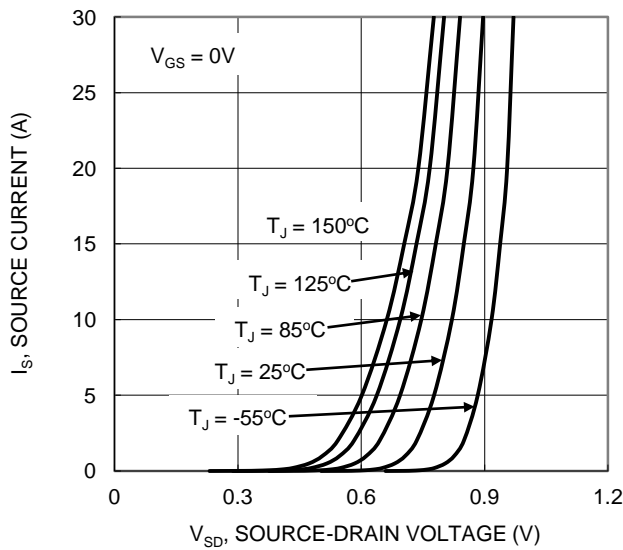
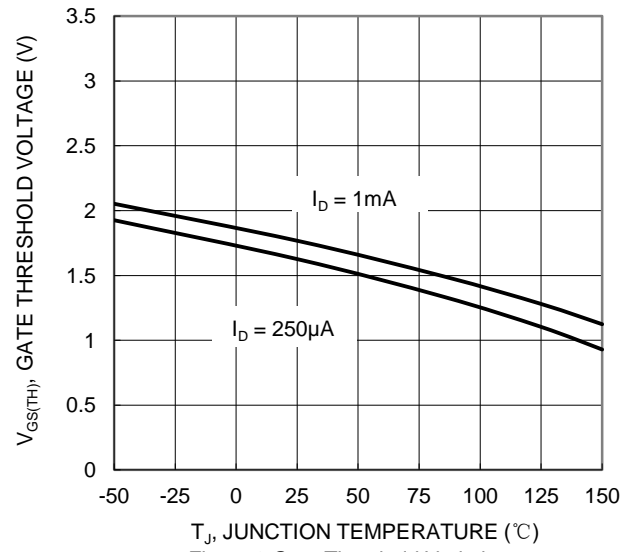
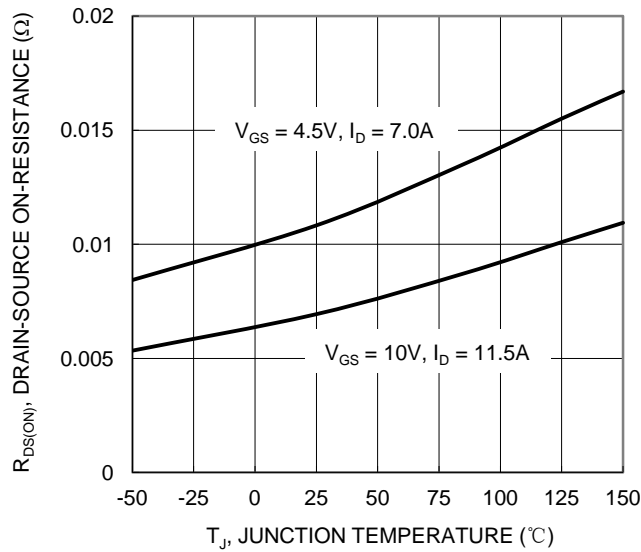


Figure 6. On-Resistance Variation with Temperature

Typical Characteristics - Q1 N-Channel (Cont.)



Typical Characteristics - Q2 N-Channel

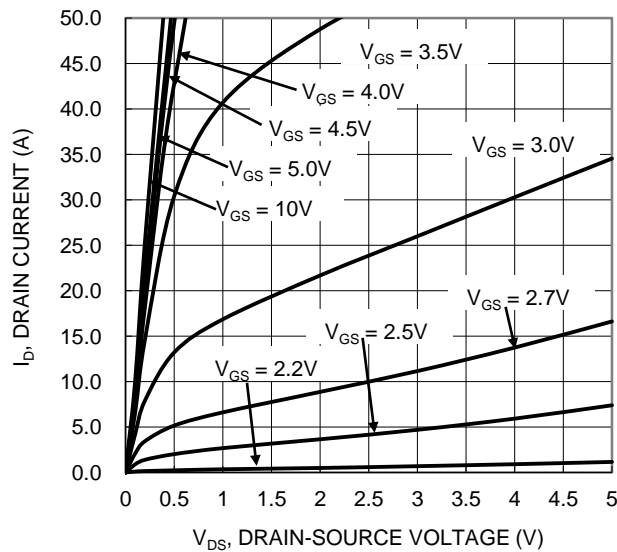


Figure 13. Typical Output Characteristic

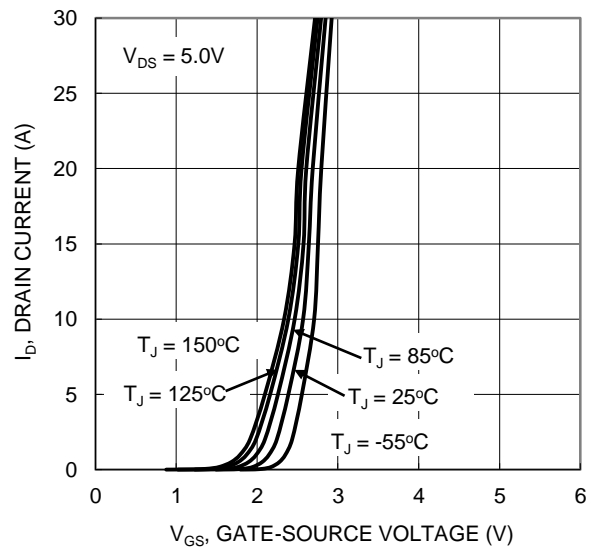


Figure 14. Typical Transfer Characteristic

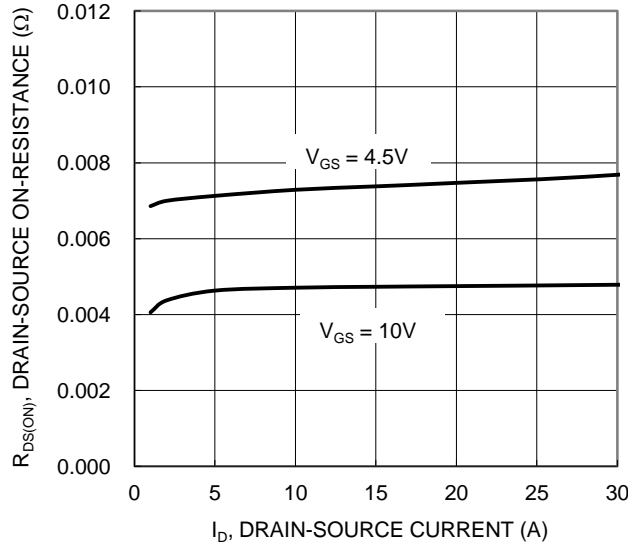


Figure 15. Typical On-Resistance vs. Drain Current and Gate Voltage

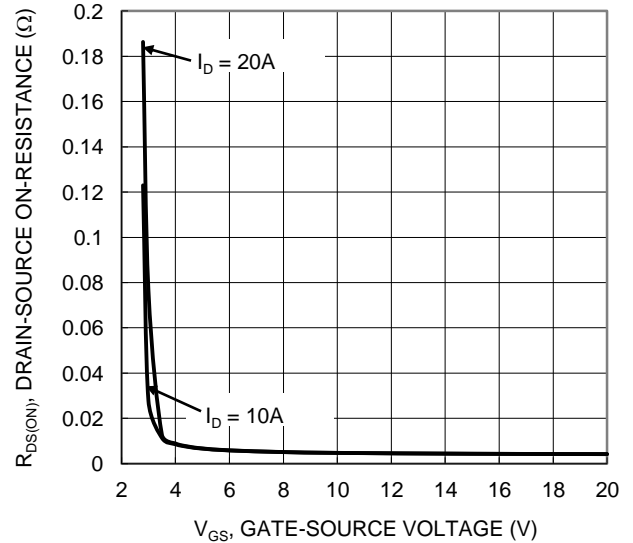


Figure 16. Typical Transfer Characteristic

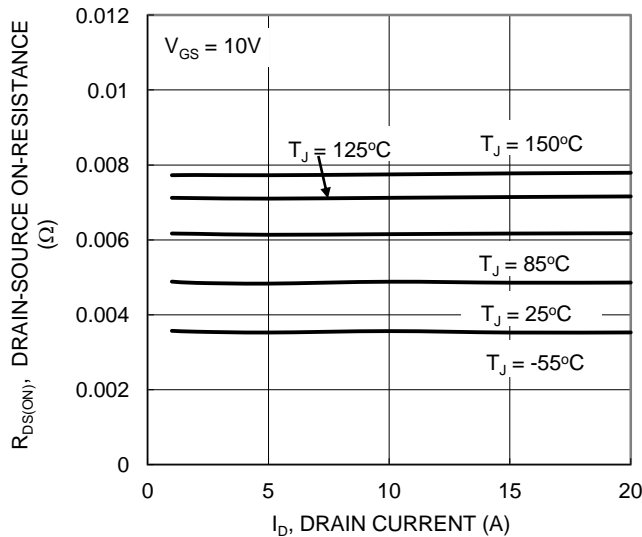


Figure 17. Typical On-Resistance vs. Drain Current and Temperature

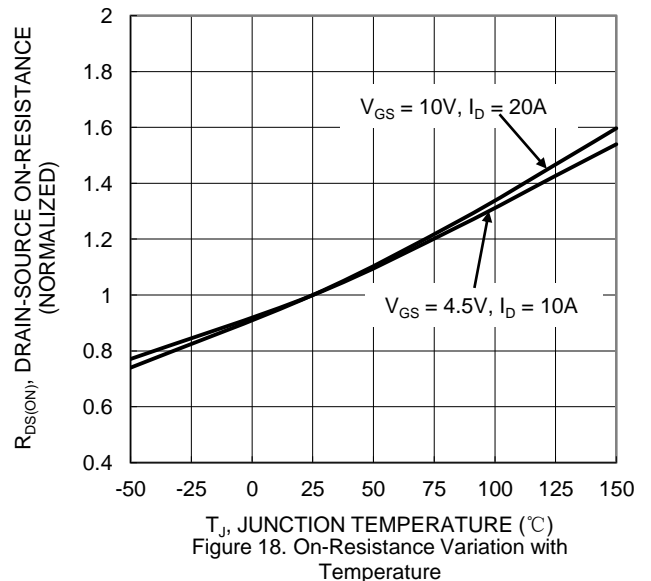


Figure 18. On-Resistance Variation with Temperature

Typical Characteristics - Q2 N-Channel (Cont.)

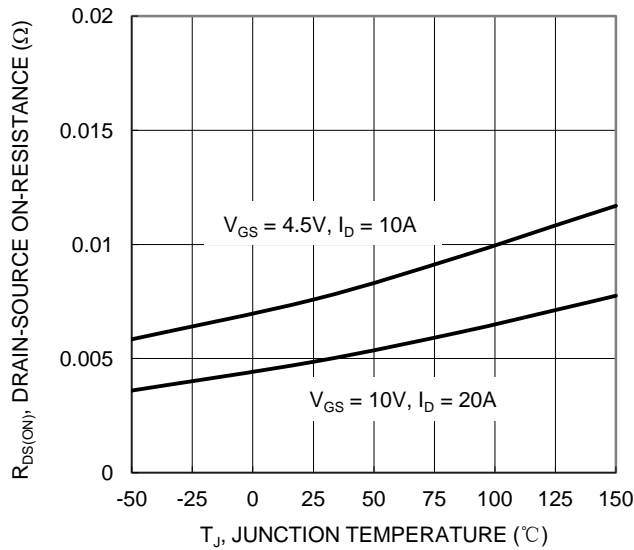


Figure 19. On-Resistance Variation with Temperature

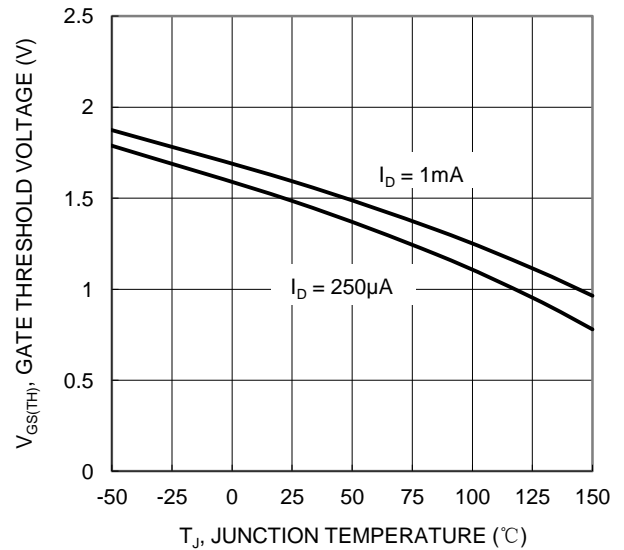


Figure 20. Gate Threshold Variation vs. Junction Temperature

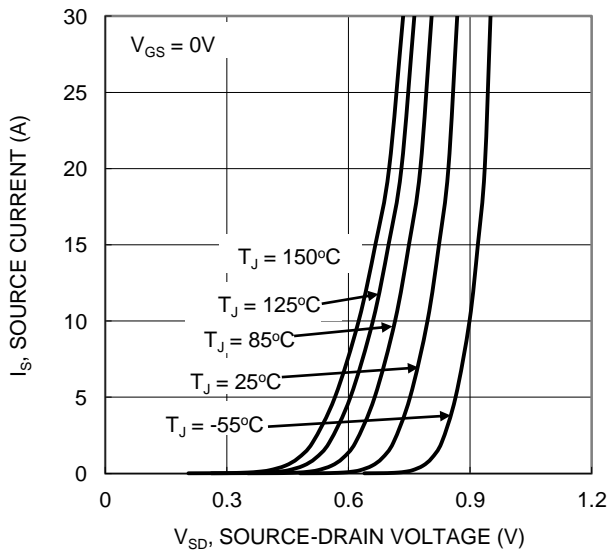


Figure 21. Diode Forward Voltage vs. Current

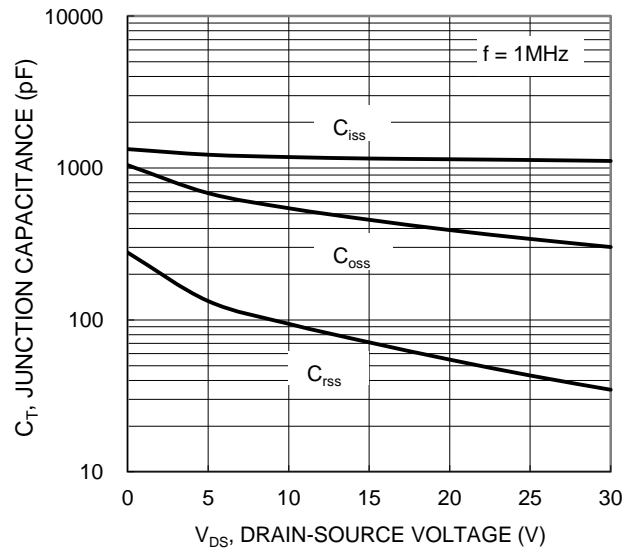


Figure 22. Typical Junction Capacitance

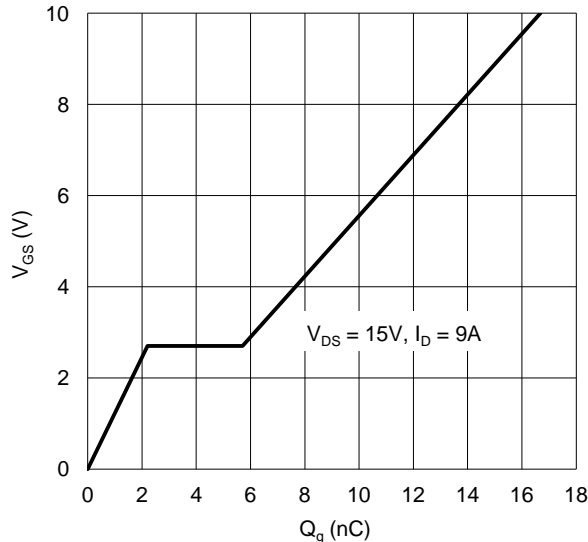


Figure 23. Gate Charge

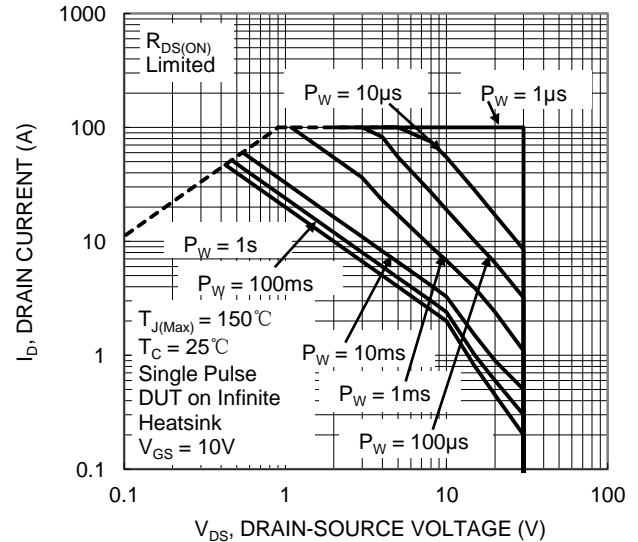


Figure 24. SOA, Safe Operation Area

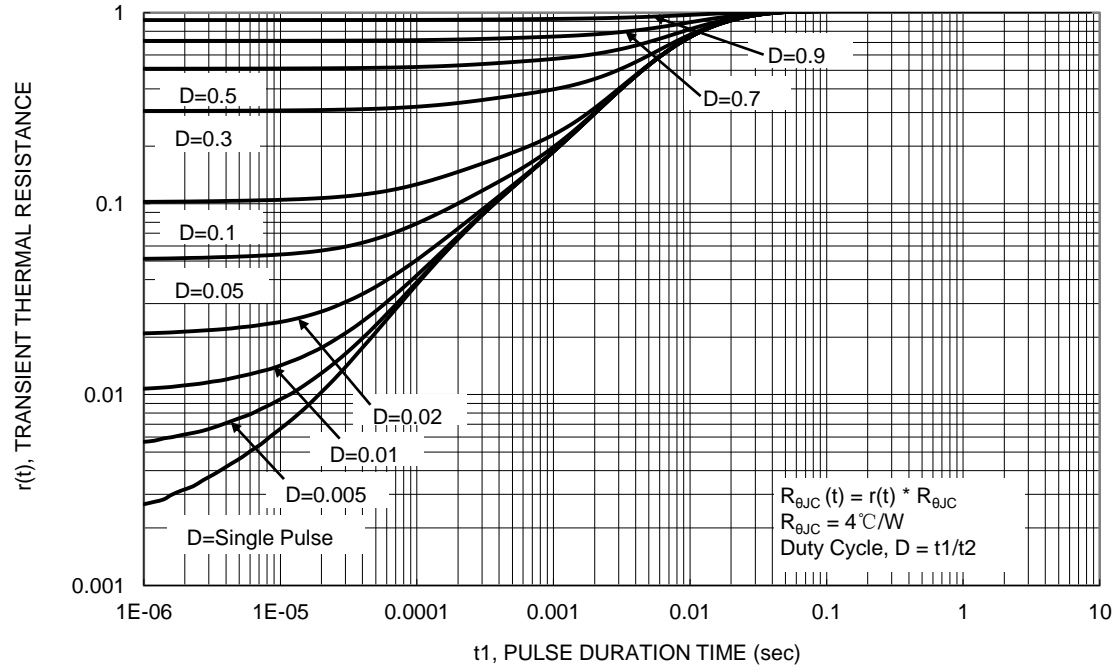
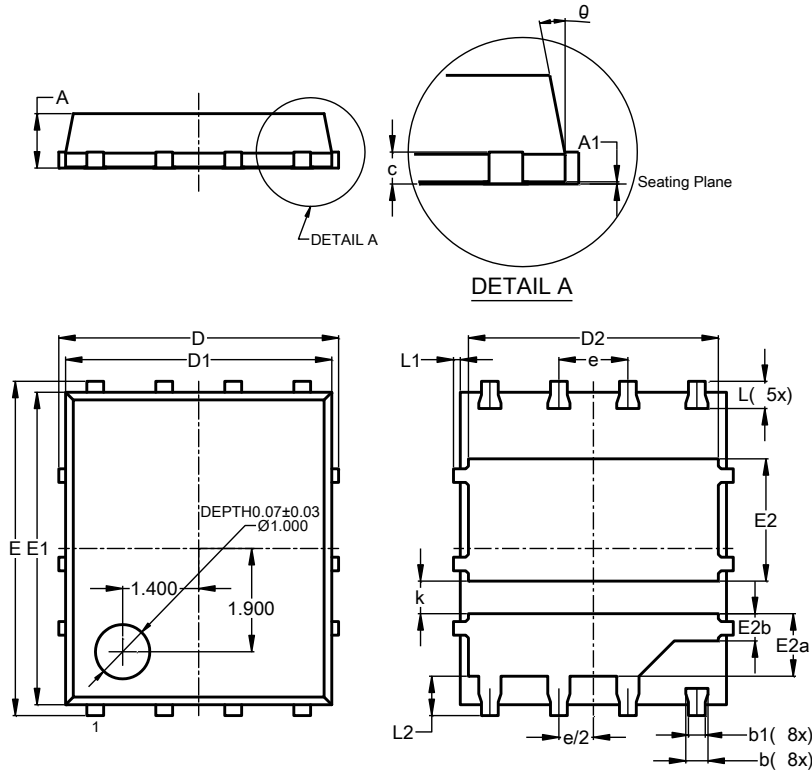


Figure 25. Transient Thermal Resistance

Package Outline Dimensions

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

PowerDI5060-8 (Type S)

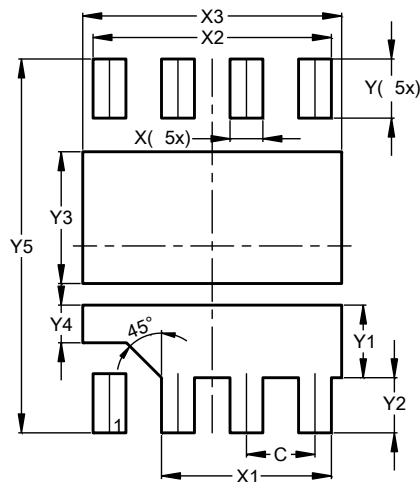


PowerDI5060-8 (Type S)			
Dim	Min	Max	Typ
A	0.90	1.10	1.00
A1	0.00	0.05	--
b	0.33	0.46	0.41
b1	0.23	0.36	0.31
c	0.230	0.330	0.254
D	--	--	5.15
D1	4.70	5.10	4.90
D2	4.50	4.70	4.60
E	--	--	6.15
E1	5.55	5.95	5.75
E2	2.15	2.35	2.25
E2a	1.05	1.25	1.15
E2b	0.45	0.55	0.50
e	1.27BSC		
k	0.50	0.70	0.60
L	0.40	0.60	0.50
L1	0.00	0.20	0.125
L2	0.625	0.825	0.725
θ	10°	12°	11°
All Dimensions in mm			

Suggested Pad Layout

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

PowerDI5060-8 (Type S)



Dimensions	Value (in mm)
C	1.270
X	0.610
X1	3.150
X2	4.420
X3	4.800
Y	1.100
Y1	1.350
Y2	1.025
Y3	2.450
Y4	0.700
Y5	6.950

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