

P-Channel 60-V (D-S) MOSFET



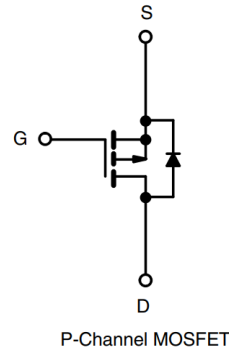
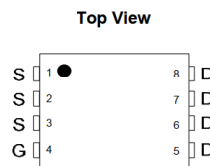
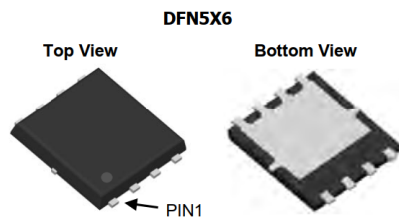
PRODUCT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
-60	0.012 at V _{GS} = -10 V	-60
	0.020 at V _{GS} = -4.5 V	-50

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified for Automotive Applications

APPLICATIONS

- Notebook
- Load Switch



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
PARAMETER	SYMBOL		Limit	UNIT
Drain-Source Voltage	V _{DS}		- 60	V
Gate-Source Voltage	V _{GS}		± 20	
Continuous Drain Current (T _J = 150 °C) ^a	T _A = 25 °C	I _D	- 60	A
	T _A = 70 °C		- 50	
Pulsed Drain Current	I _{DM}		- 240	
Continuous Source Current (Diode Conduction) ^a	I _S		- 60	
Avalanche Current	L = 0.1 mH	I _{AS}	- 62	
Single Pulse Avalanche Energy		E _{AS}	225	mJ
Maximum Power Dissipation ^a	T _A = 25 °C	P _D	43	W
	T _A = 70 °C		38	
Operating Junction and Storage Temperature Range	T _J , T _{stg}		-55 to +175	°C
Soldering Recommendations (Peak Temperature) ^{b, c}			260	

THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL		TYPICAL	MAXIMUM	UNIT
Maximum Junction-to-Ambient ^a	t ≤ 10 s	R _{thJA}	15	23	°C/W
	Steady State		22	35	
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	1	1.3	

Notes

- Surface mounted on 1" x 1" FR4 board.
- The DFN5x6 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

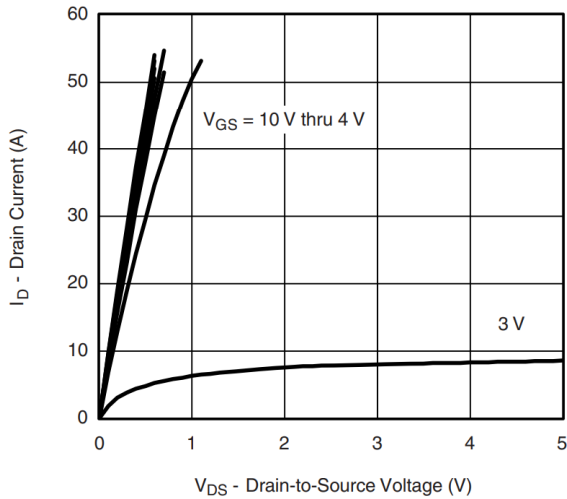
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1	-	-3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}$	-	-	-1	μA
		$V_{DS} = -48\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\ \text{V}, V_{GS} = -10\ \text{V}$	-60	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\ \text{V}, I_D = -15\ \text{A}$	-	0.012	0.0145	Ω
		$V_{GS} = -4.5\ \text{V}, I_D = -10\ \text{A}$	-	0.020	0.0250	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\ \text{V}, I_D = -15\ \text{A}$	-	31	-	S
Diode Forward Voltage ^a	V_{SD}	$I_S = -4.5\ \text{A}, V_{GS} = 0\ \text{V}$	-	-0.7	-1.2	V
Dynamic ^b						
Total Gate Charge	Q_g	$V_{DS} = -30\ \text{V}, V_{GS} = -10\ \text{V}, I_D = -15\ \text{A}$	-	121	190	nC
Gate-Source Charge	Q_{gs}		-	20	-	
Gate-Drain Charge	Q_{gd}		-	32	-	
Gate Resistance	R_g		-	3	-	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -30\ \text{V}, R_L = 30\ \Omega$ $I_D \cong -15\ \text{A}, V_{GEN} = -10\ \text{V}, R_g = 6\ \Omega$	-	20	30	ns
Rise Time	t_r		-	20	30	
Turn-Off Delay Time	$t_{d(off)}$		-	205	310	
Fall Time	t_f		-	90	135	
Source-Drain Reverse Recovery Time	t_{rr}		$I_F = -4.5\ \text{A}, dI/dt = 100\ \text{A}/\mu\text{s}$	-	45	

Notes

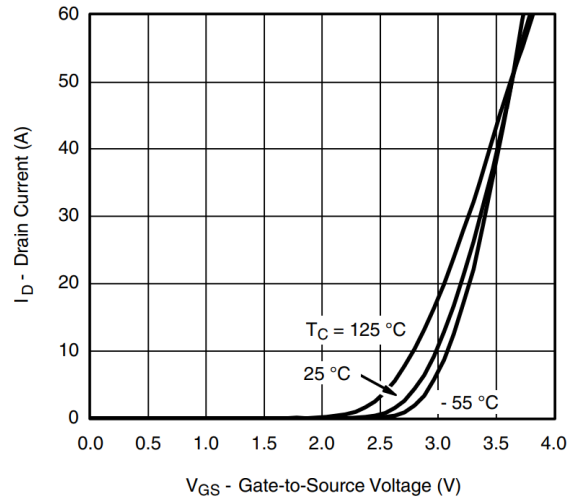
- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

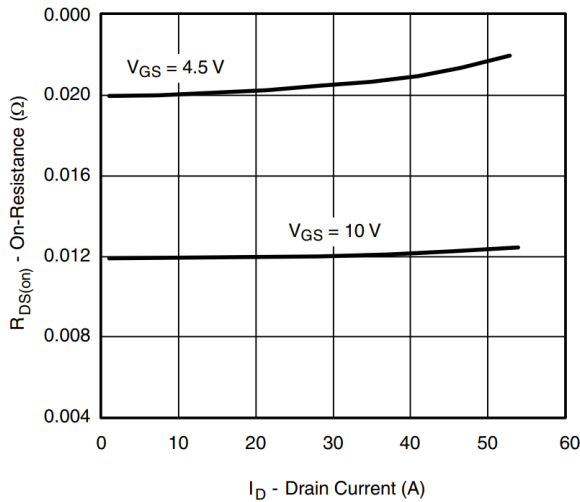
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



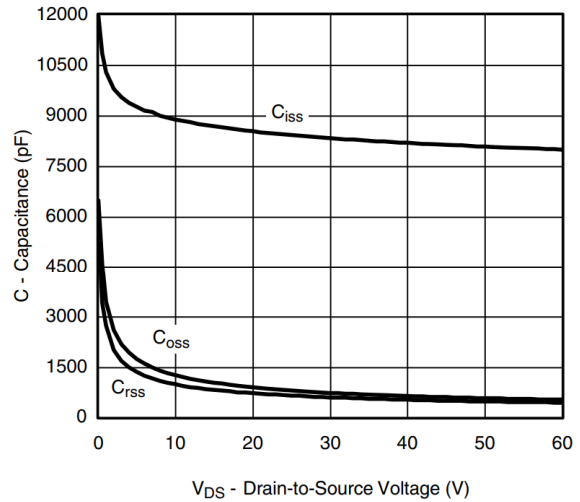
Output Characteristics



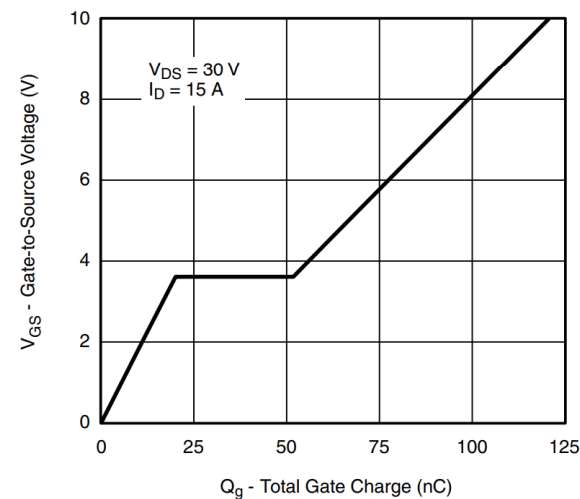
Transfer Characteristics



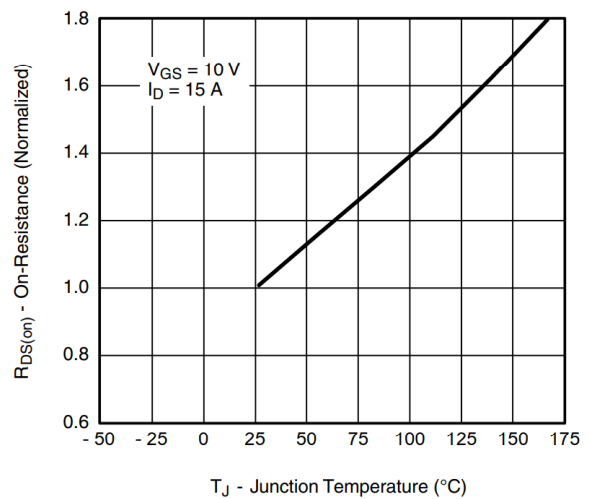
On-Resistance vs. Drain Current



Capacitance

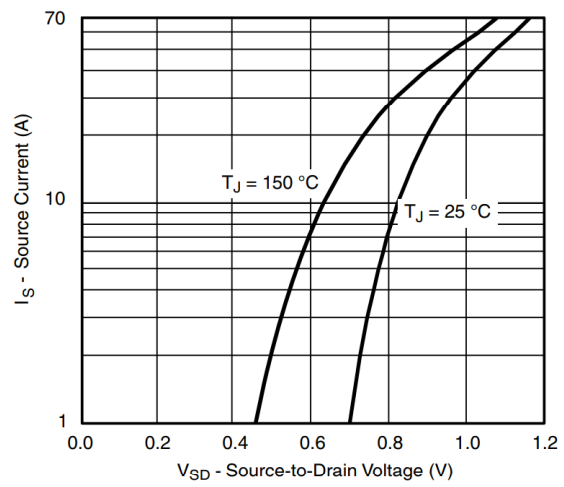


Gate Charge

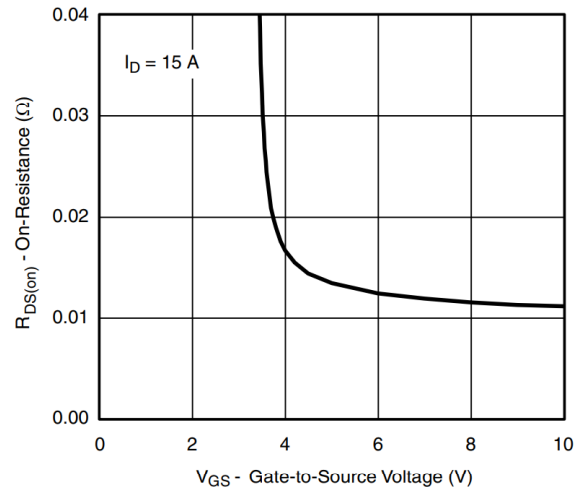


On-Resistance vs. Junction Temperature

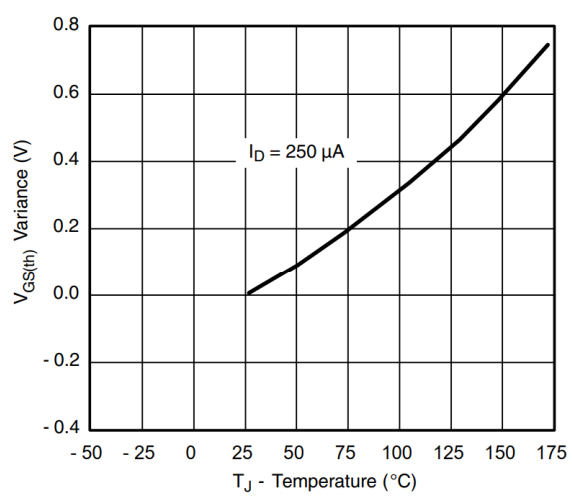
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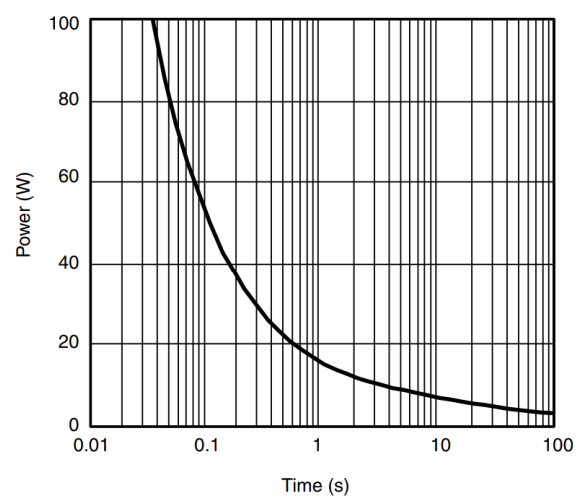
Source-Drain Diode Forward Voltage



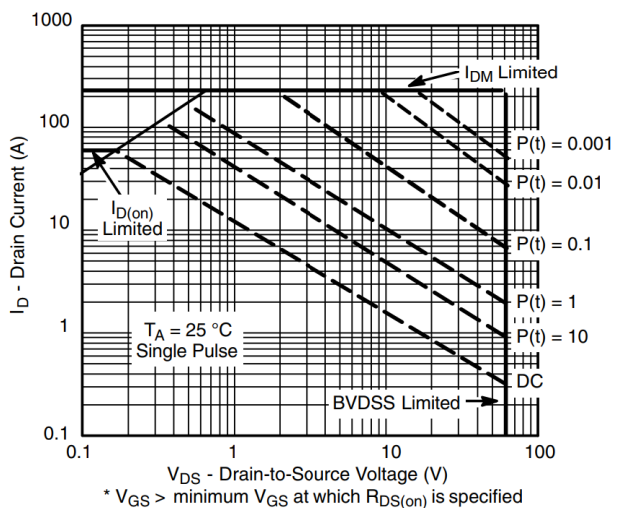
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



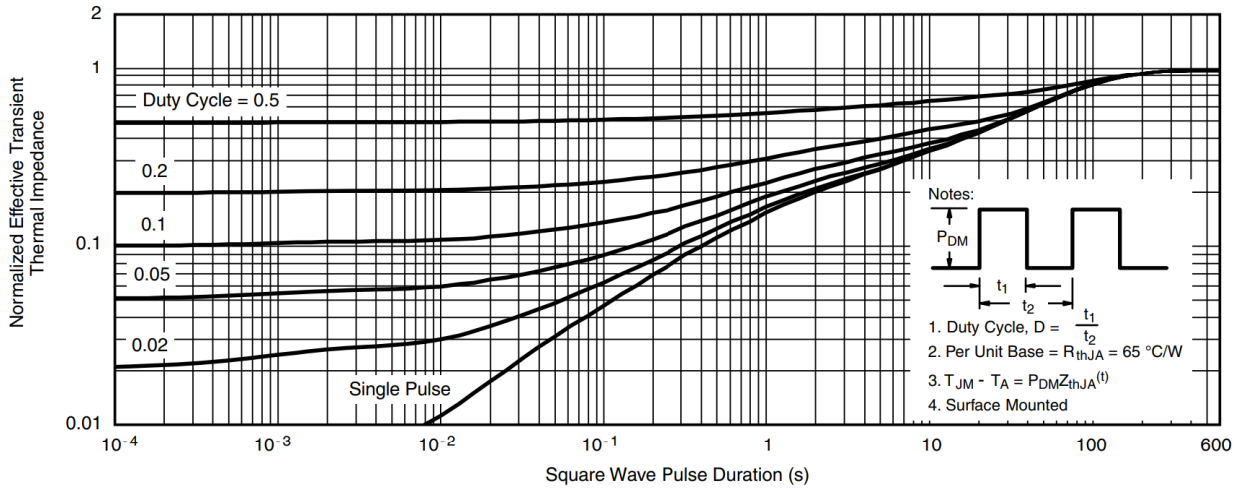
Single Pulse Power, Junction-to-Ambient



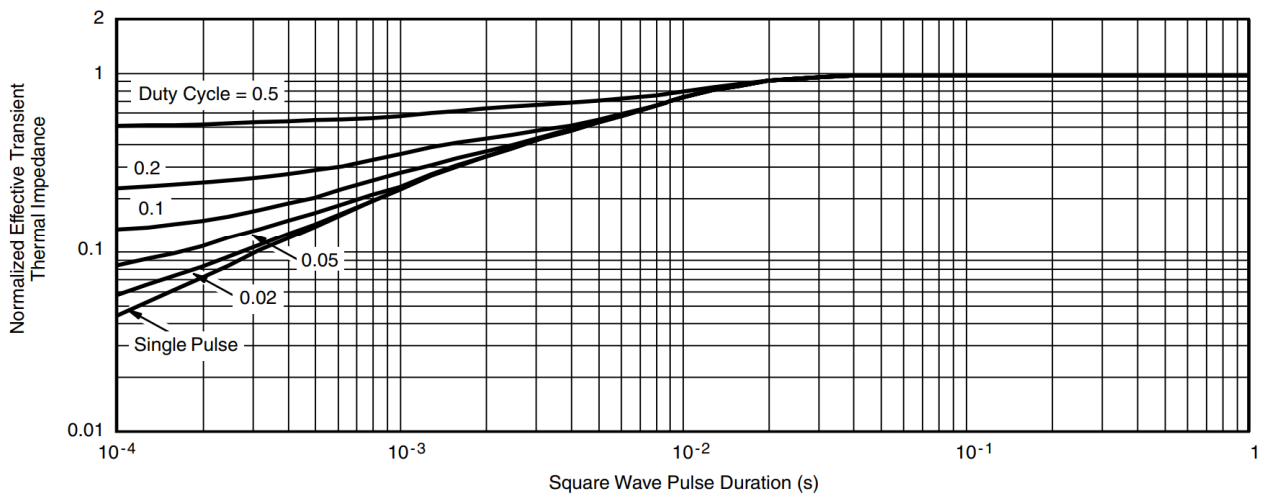
Safe Operating Area

* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

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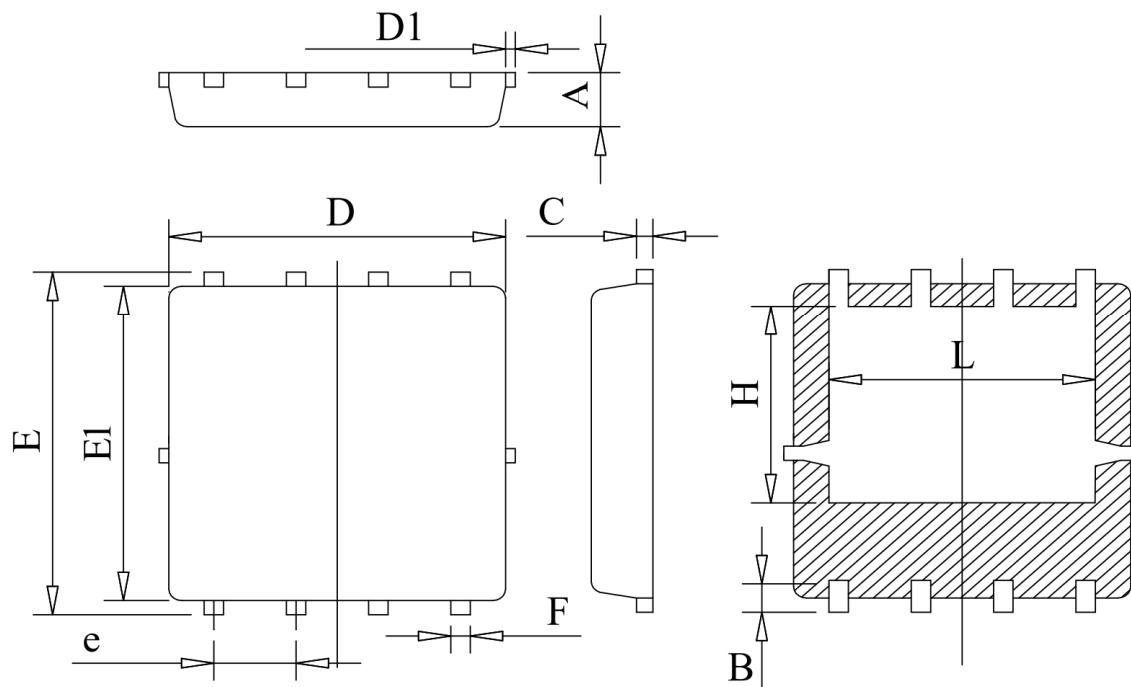


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

DFN5X6-8L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

Unit : mm

Symbol	Min	Typ	Max
A	0.78	0.95	1.12
B	0.45	0.58	0.78
C	0.18	0.254	0.36
D	4.70	5.20	5.45
D1			0.18
E	5.85	6.05	6.25
E1	5.38	5.55	5.98
e	1.15	1.27	1.40
F	0.18	0.30	0.52
H	3.25	3.47	3.70
L	3.75	4.00	4.25

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