

## Dual P-Channel Enhancement Mode Power MOSFET

**Description**

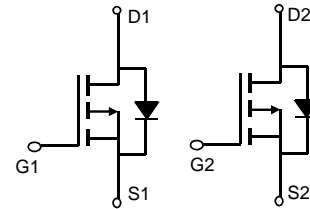
The HM2819D uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

**General Features**

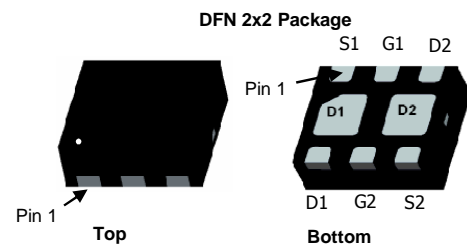
- $V_{DS} = -40V, I_D = -5.0A$   
 $R_{DS(ON)} < 135m\Omega @ V_{GS} = -2.5V$   
 $R_{DS(ON)} < 80m\Omega @ V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

**Application**

- PWM applications
- Load switch
- Power management



Schematic diagram

**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM2819D	HM2819D	DFN2X2-6L	Ø180mm	8 mm	3000 units

**Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	-40	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	$I_D$	-5.0	A
	$T_C = 70^\circ\text{C}$		-4.0	
	$T_A = 25^\circ\text{C}$		-3.5	
	$T_A = 70^\circ\text{C}$		-2.8	
Drain Current -Pulsed (Note 1)		$I_{DM}$	-40	A
Maximum Power Dissipation		$P_D$	6.8	W
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55 To 150	$^\circ\text{C}$

**Thermal Characteristic**

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	74	$^\circ\text{C/W}$
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**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-2.0	-3.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-4.1A$	-	73	80	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	-	110	135	
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-2A$	6	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	$C_{iss}$	$V_{DS}=-4V, V_{GS}=0V,$ $F=1.0MHz$	-	740	-	PF
Output Capacitance	$C_{oss}$		-	290	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	190	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-4V, I_D=-3.3A,$ $R_L=-1.2\Omega, V_{GEN}=-4.5V, R_g=1\Omega$	-	12	-	nS
Turn-on Rise Time	$t_r$		-	35	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	$t_f$		-	10	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-4V, I_D=-4.1A, V_{GS}=-4.5V$	-	7.8	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-1.6A$	-	-	-1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	1.6	A

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

# Typical Electrical and Thermal Characteristics

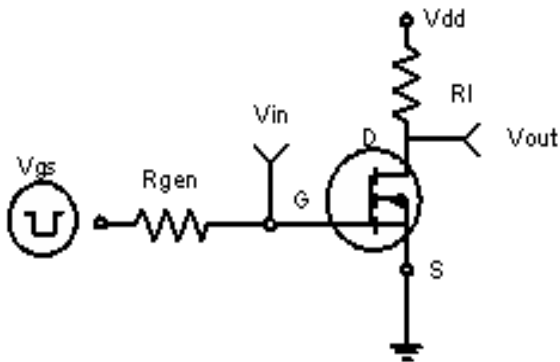


Figure 1: Switching Test Circuit

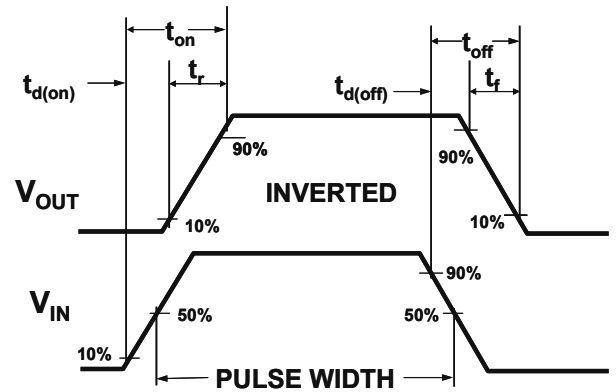


Figure 2: Switching Waveforms

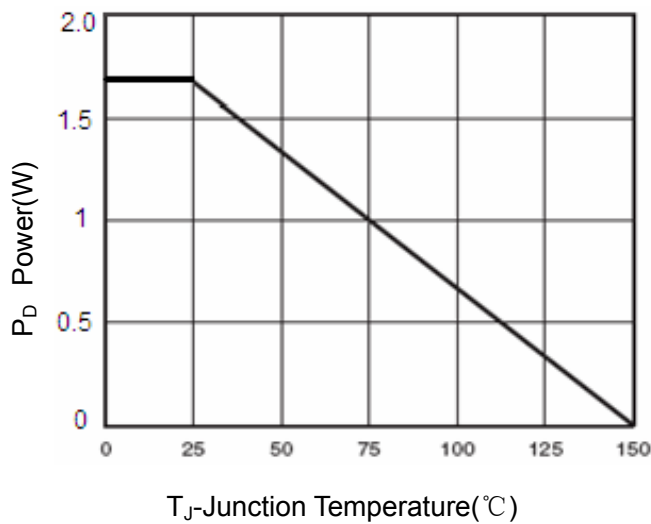


Figure 3 Power Dissipation

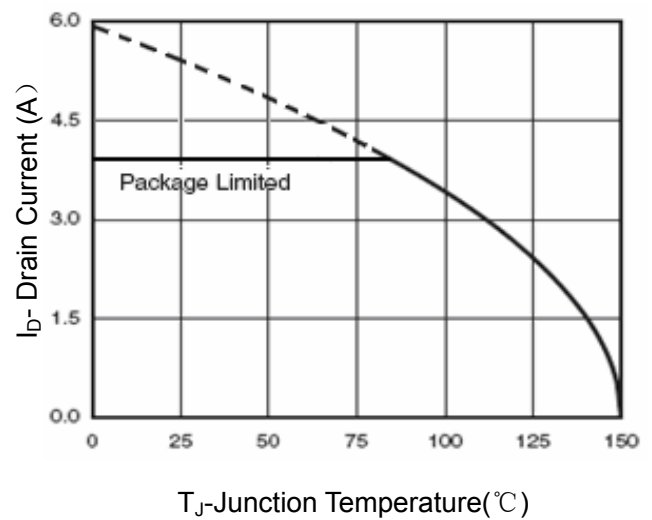


Figure 4 Drain Current

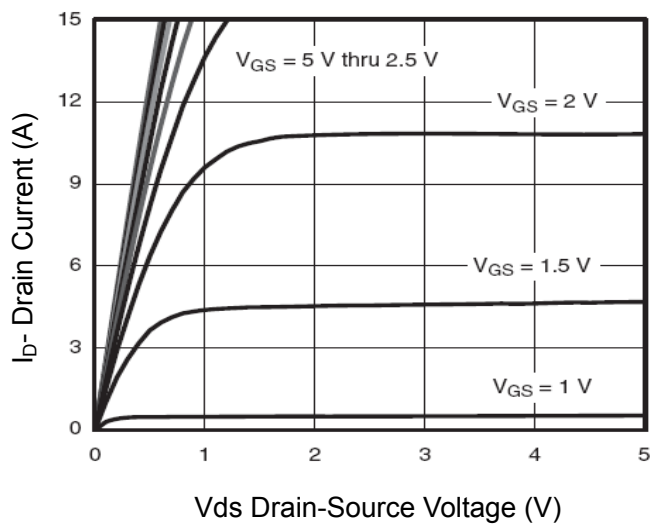


Figure 5 Output Characteristics

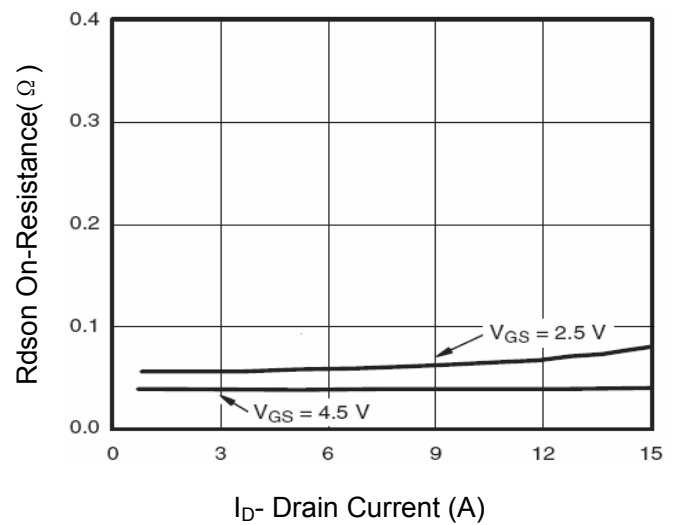


Figure 6 Drain-Source On-Resistance

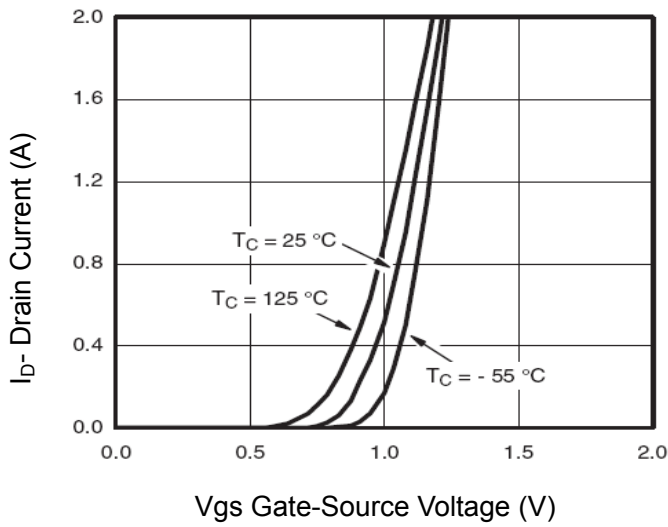


Figure 7 Transfer Characteristics

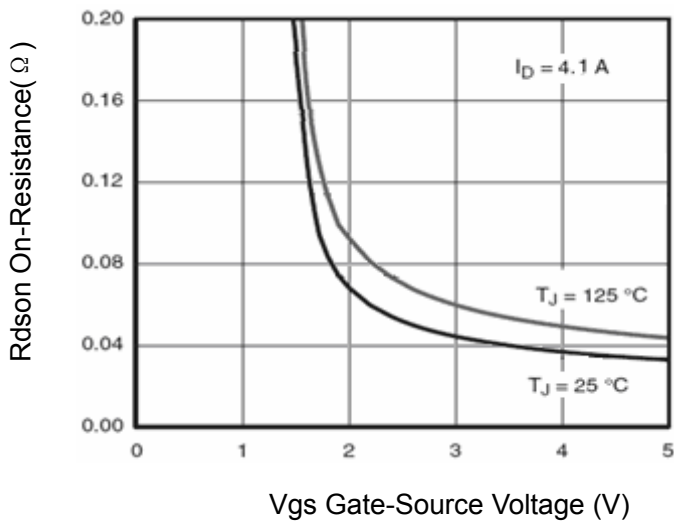


Figure 9  $R_{DS(on)}$  vs  $V_{GS}$

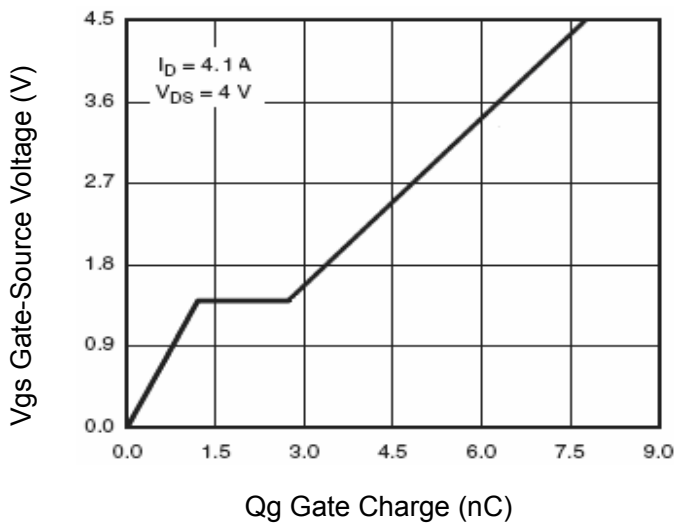


Figure 11 Gate Charge

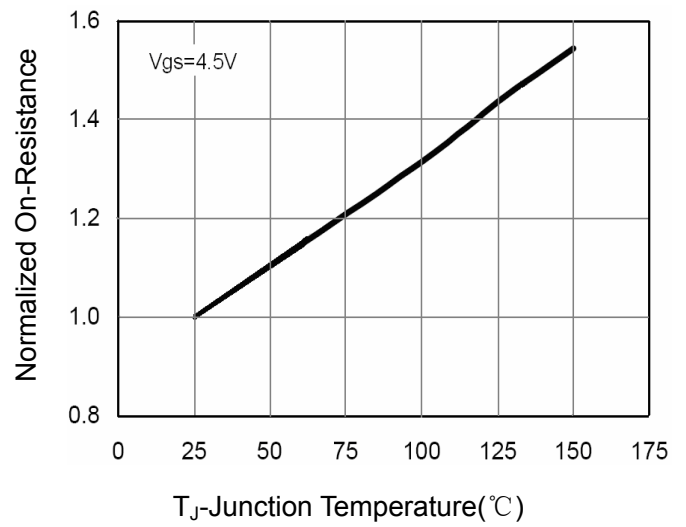


Figure 8 Drain-Source On-Resistance

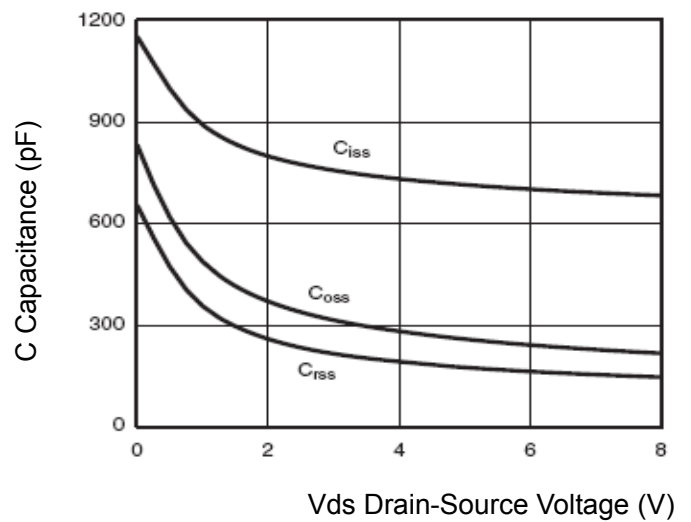


Figure 10 Capacitance vs  $V_{DS}$

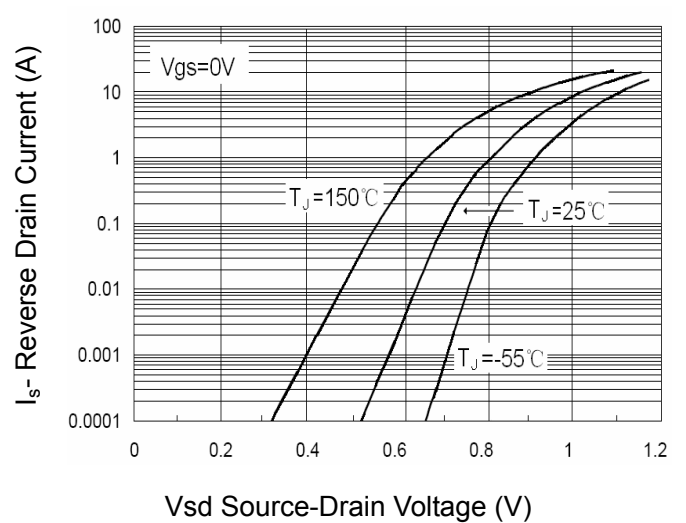
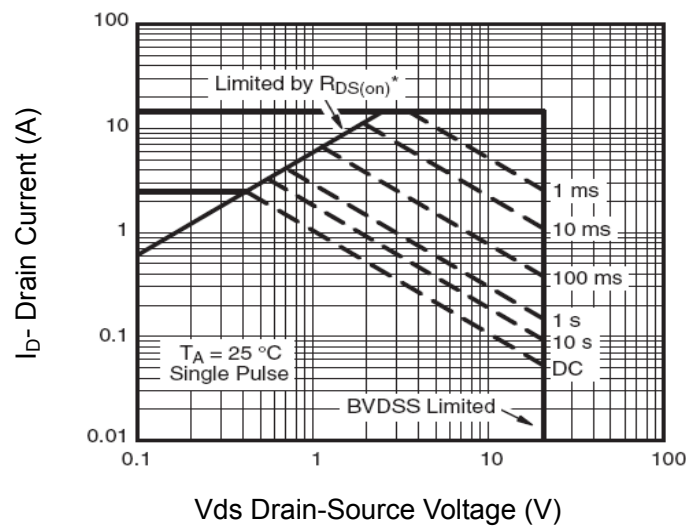
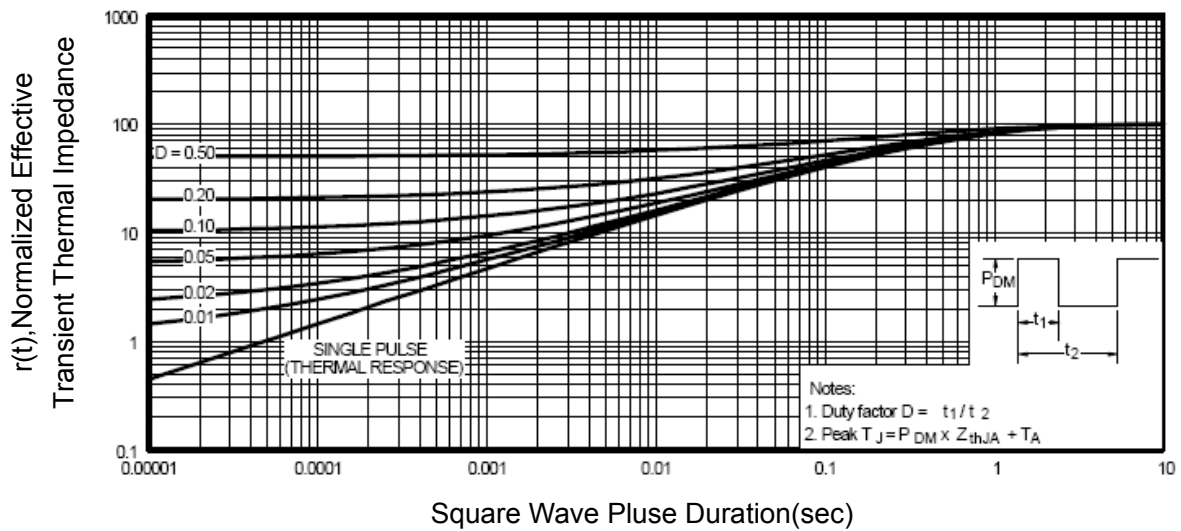


Figure 12 Source- Drain Diode Forward

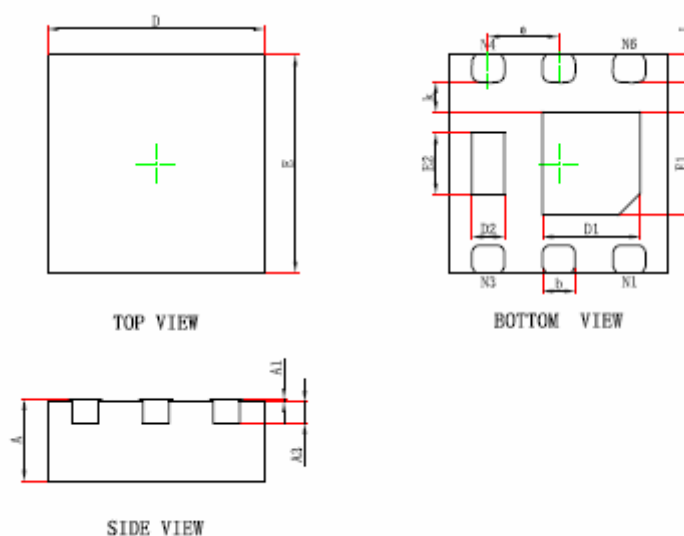


**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

## DFN2X2-6L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.924	2.076	0.076	0.082
E	1.924	2.076	0.076	0.082
D1	0.800	1.000	0.031	0.039
E1	0.850	1.050	0.033	0.041
D2	0.200	0.400	0.008	0.016
E2	0.460	0.660	0.018	0.026
k	0.200MIN.		0.008MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.174	0.326	0.007	0.013

## Notes

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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