

P-Channel Enhancement Mode Power MOSFET

Description

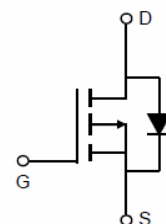
The HM45P02D uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

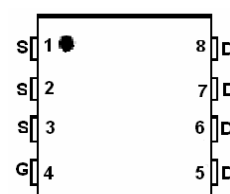
- $V_{DS} = -20V, I_D = -45A$
 $R_{DS(ON)} < 7m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 12m\Omega @ V_{GS} = -1.8V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Load switch
- Battery protection



Schematic diagram



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM45P02D	HM45P02D	DFN5X6-8L	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	-45	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	-35	A
Pulsed Drain Current	I_{DM}	-200	A
Maximum Power Dissipation	P_D	80	W
Derating factor		0.64	W/ $^\circ C$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	1.6	$^\circ C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-16V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.6	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-20A	-	5.8	7	mΩ
		V _{GS} =-2.5V, I _D =-20A	-	7.2	9	
		V _{GS} =-1.8V, I _D =-20A		9	12	
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-20A	80	-	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, F=1.0MHz	-	3500	-	PF
Output Capacitance	C _{oss}		-	577	-	PF
Reverse Transfer Capacitance	C _{rss}		-	445	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, R _{GEN} =3Ω V _{GS} =-4.5V, R _L =0.5Ω	-	18	-	nS
Turn-on Rise Time	t _r		-	42	-	nS
Turn-Off Delay Time	t _{d(off)}		-	85	-	nS
Turn-Off Fall Time	t _f		-	23	-	nS
Total Gate Charge	Q _g	V _{DS} =-10V, I _D =-20A, V _{GS} =-4.5V	-	55	-	nC
Gate-Source Charge	Q _{gs}		-	10	-	nC
Gate-Drain Charge	Q _{gd}		-	15	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =-20A	-	-	-1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	-45	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = -10A	-	47	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ^(Note3)	-	53	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

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

Typical Electrical and Thermal Characteristics (Curves)

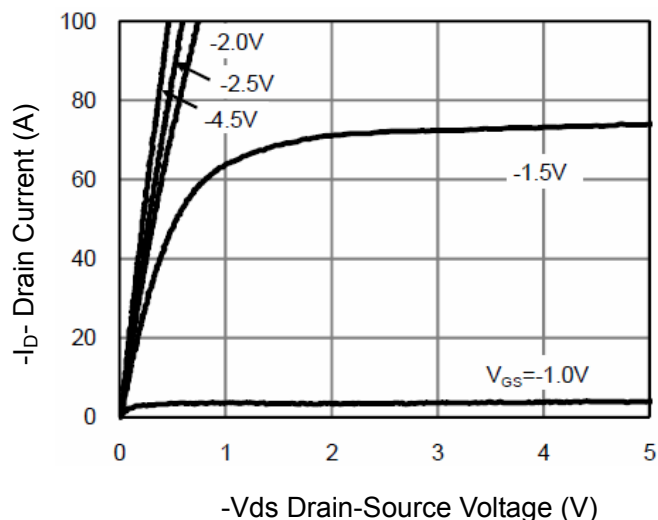


Figure 1 Output Characteristics

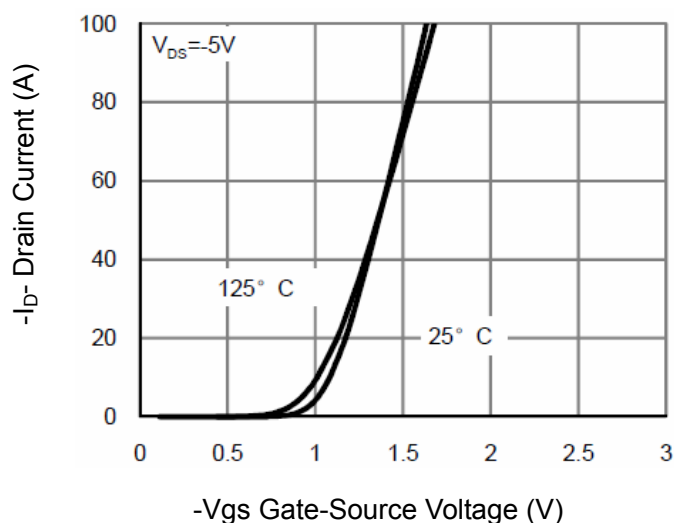


Figure 2 Transfer Characteristics

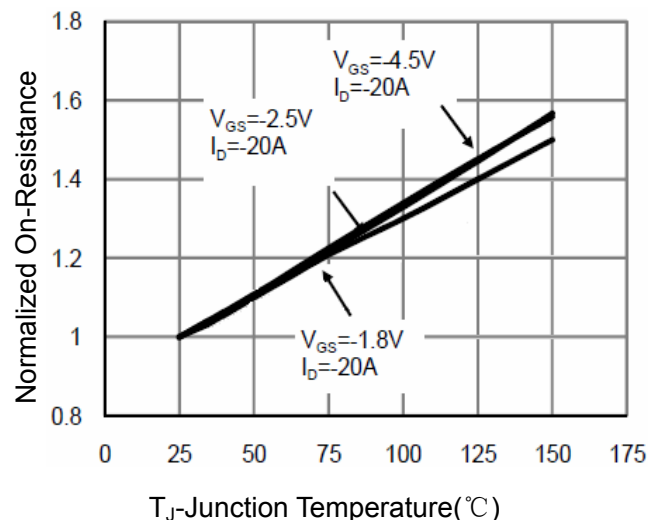


Figure 4 R_DS(on)-Junction Temperature

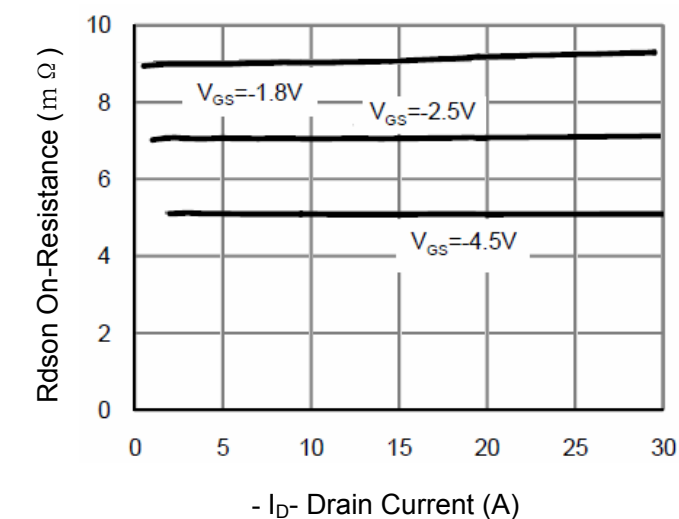


Figure 3 R_DS(on)- Drain Current

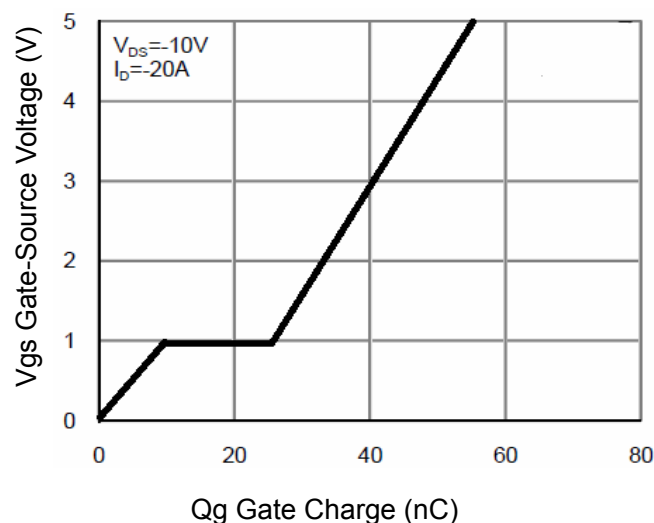


Figure 5 Gate Charge

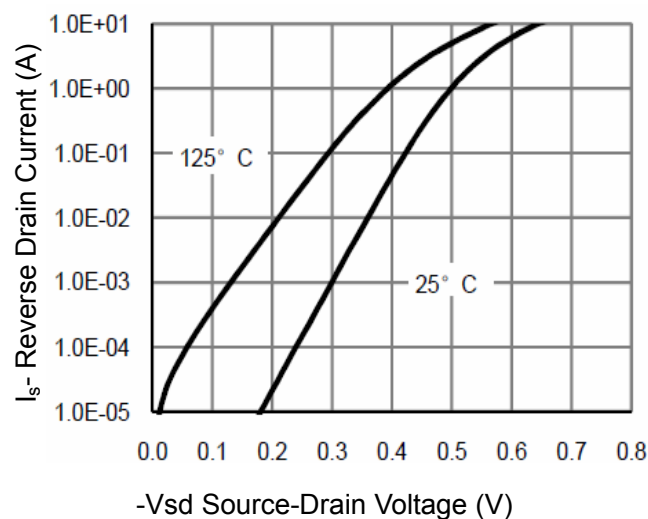
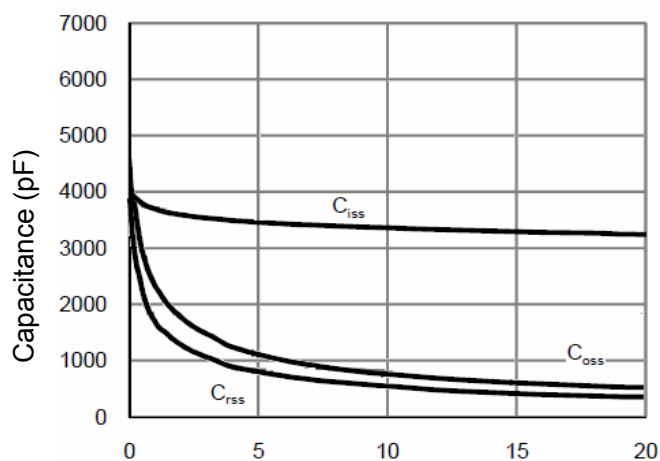
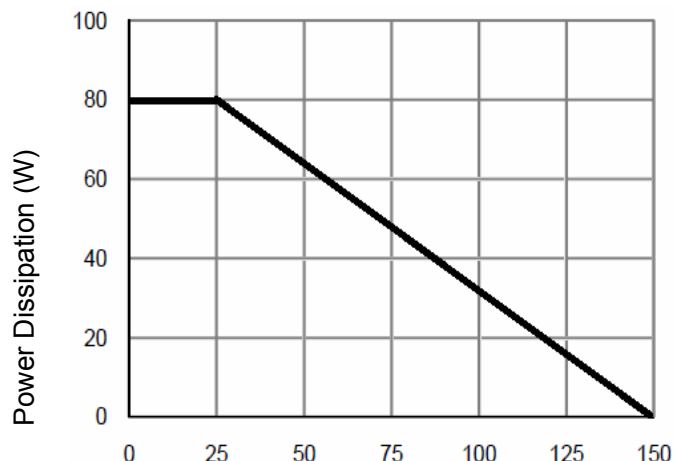


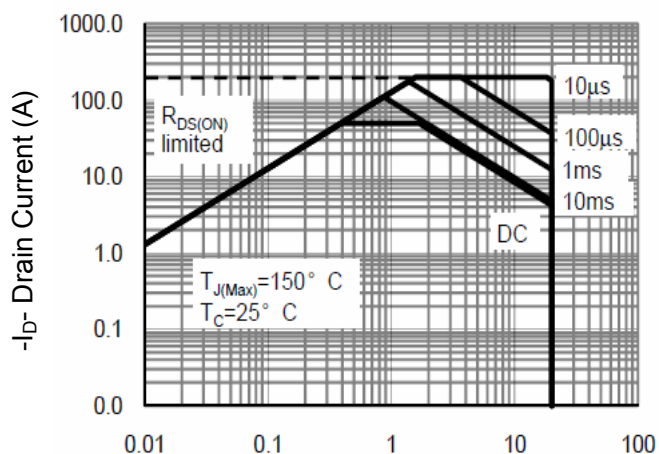
Figure 6 Source- Drain Diode Forward



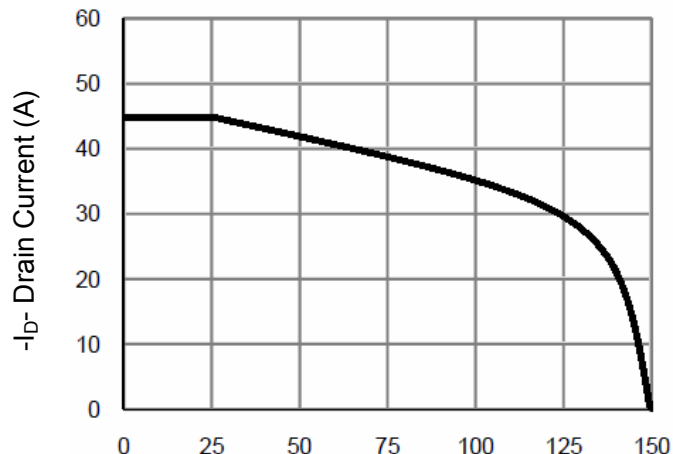
-Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



T_J-Junction Temperature(°C)
Figure 9 Power De-rating



-Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature(°C)
Figure 10 -Current De-rating

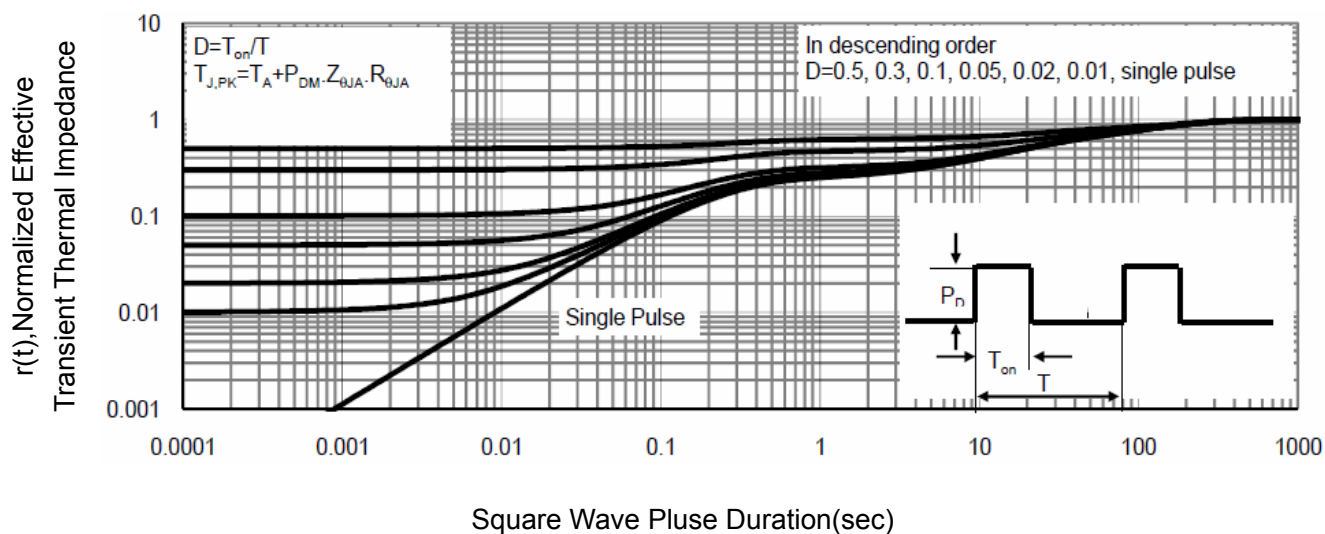
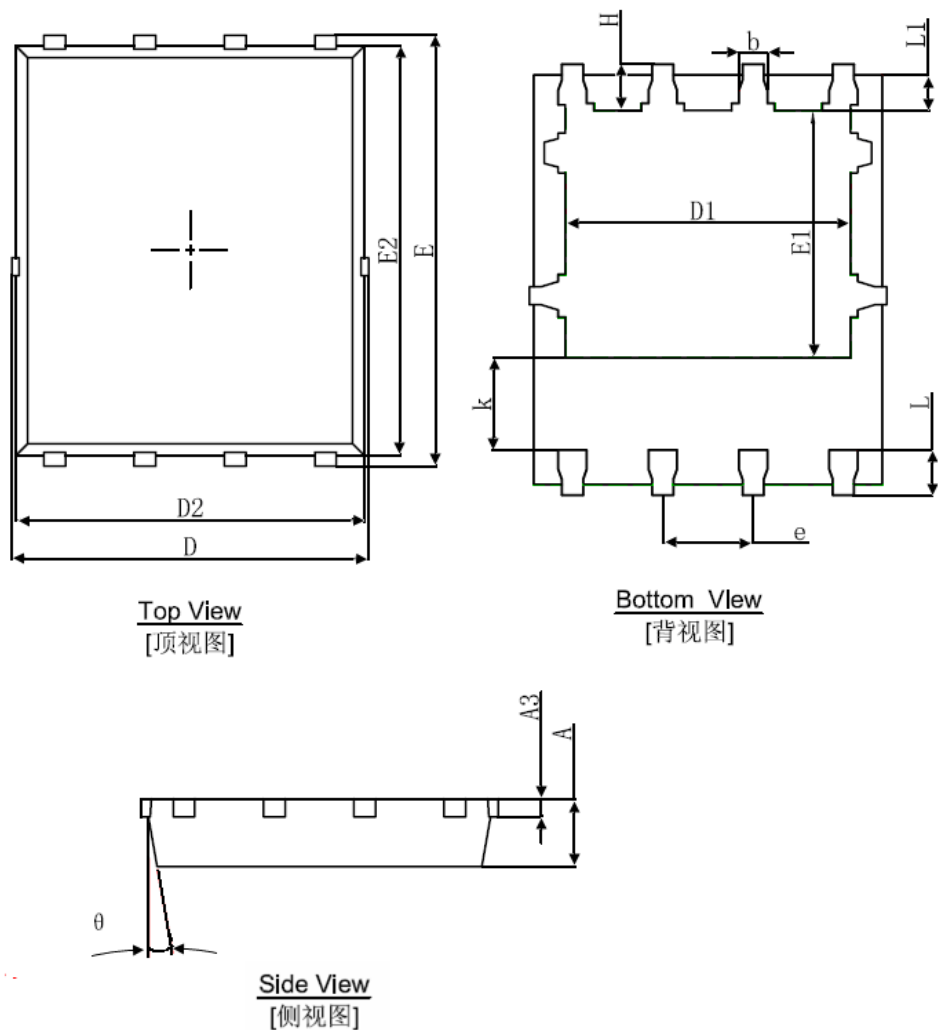


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°