

## P-Channel Enhancement Mode Power MOSFET

### Description

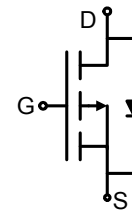
The HM4453A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

### General Features

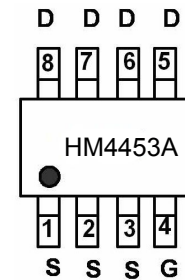
- $V_{DS} = -20V, I_D = -21A$   
 $R_{DS(ON)} < 7m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = -2.5V$
- High power and current handling capability
- Lead free product is acquired
- Surface Mount Package

### Application

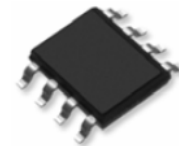
- Motor drive
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



SOP-8 top view

### Package Marking And Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM4453A	HM4453A	SOP-8	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	-21	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	-40	A
Maximum Power Dissipation	$P_D$	3.1	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)	$R_{\theta JA}$	42	$^\circ\text{C/W}$
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### Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20	-	-	V

Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.4	-0.6	-1	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	-	5.8	7	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-5A		7.2	9	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-6A	-	17	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1.0MHz	-	2100	-	PF
Output Capacitance	C <sub>OSS</sub>		-	498	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	300	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-10V, R <sub>L</sub> =10Ω, V <sub>GS</sub> =-4.5V, R <sub>GEN</sub> =6Ω	-	25	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	30	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	70	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	50	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-6A, V <sub>GS</sub> =-4.5V	-	17	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	4.1	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	4.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-21A	-	-	-1.2	V

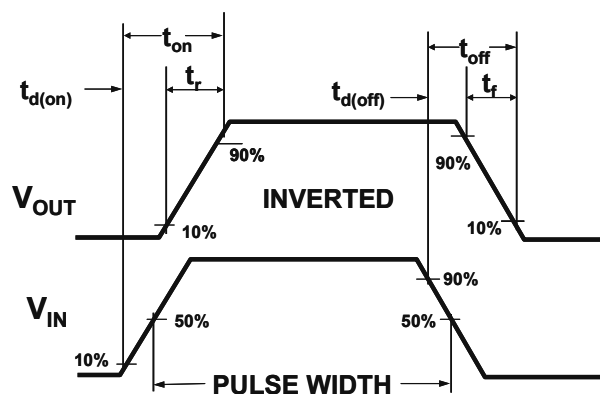
## Notes:

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

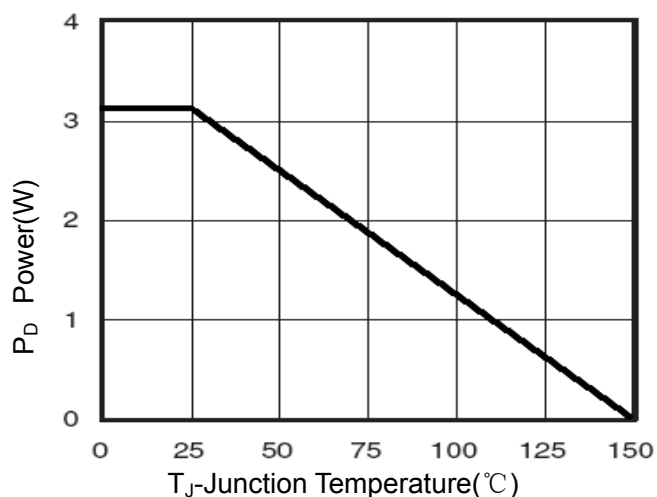
## Typical Electrical and Thermal Characteristics



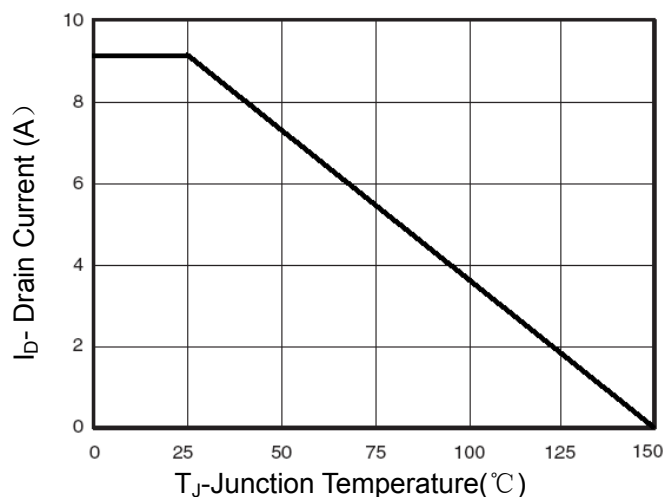
**Figure 1 Switching Test Circuit**



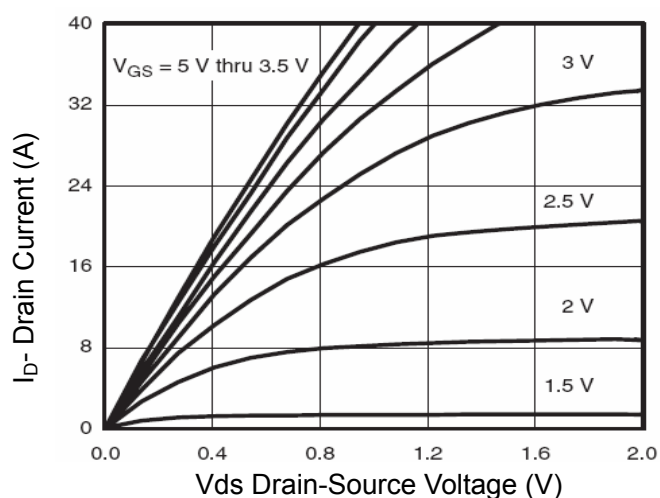
**Figure 2 Switching Waveforms**



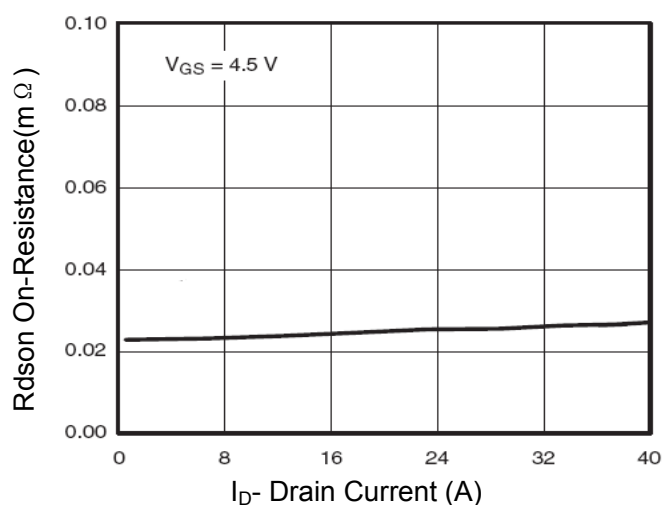
**Figure 3 Power Dissipation**



**Figure 4 Drain Current**



**Figure 5 Output Characteristics**



**Figure 6 Drain-Source On-Resistance**

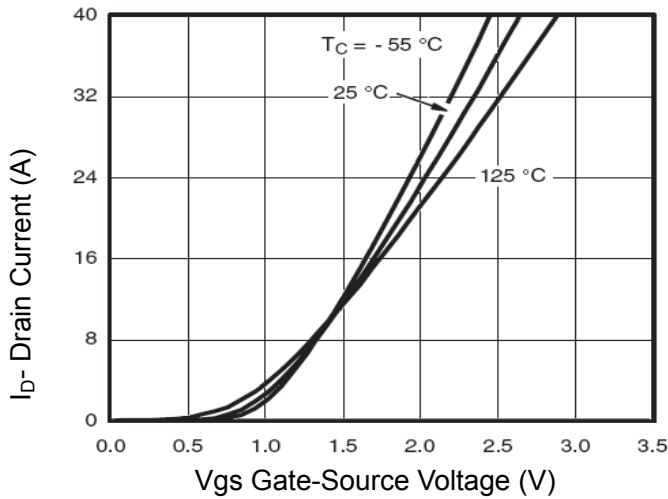


Figure 7 Transfer Characteristics

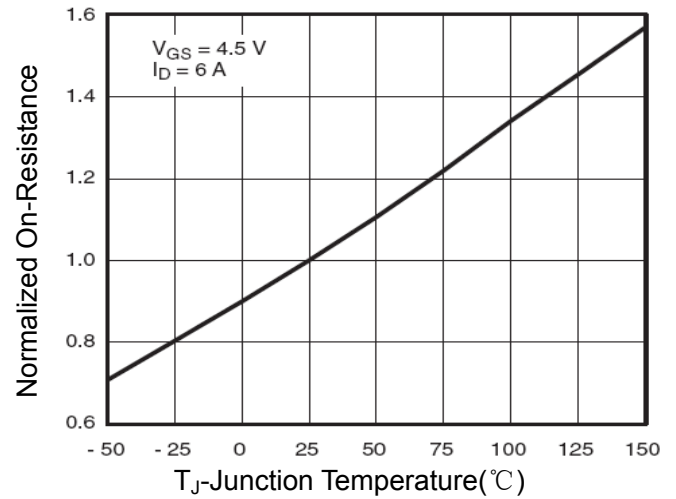


Figure 8 Drain-Source On-Resistance

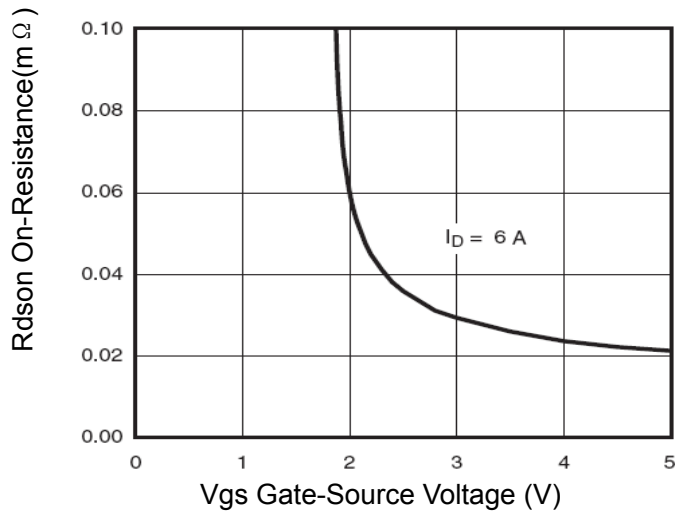


Figure 9  $R_{DS(on)}$  vs  $V_{GS}$

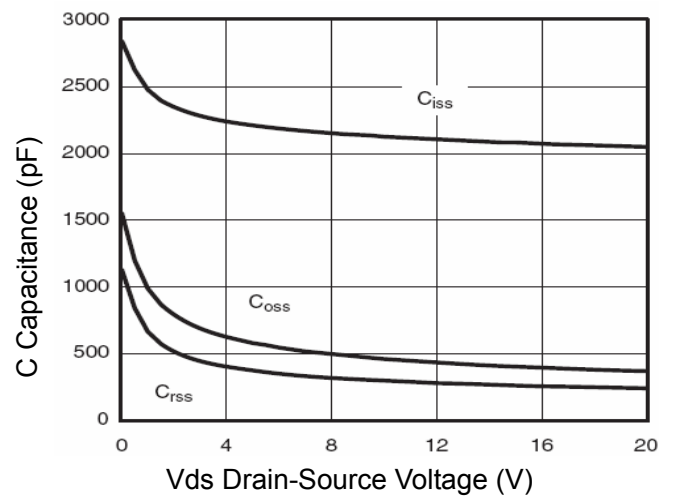


Figure 10 Capacitance vs  $V_{DS}$

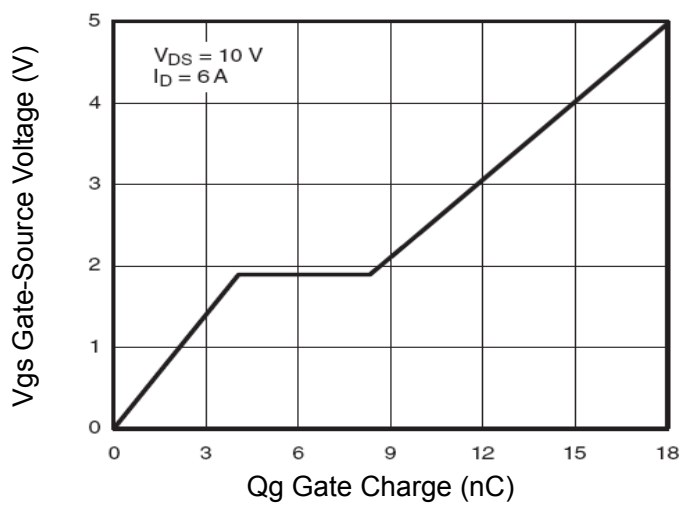


Figure 11 Gate Charge

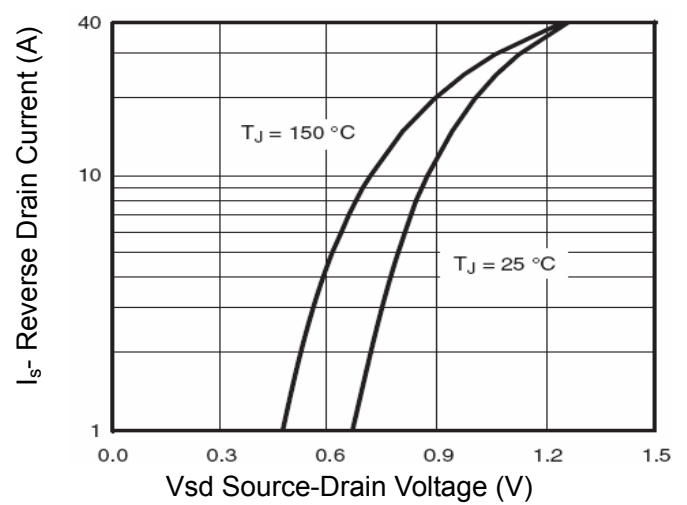


Figure 12 Source- Drain Diode Forward

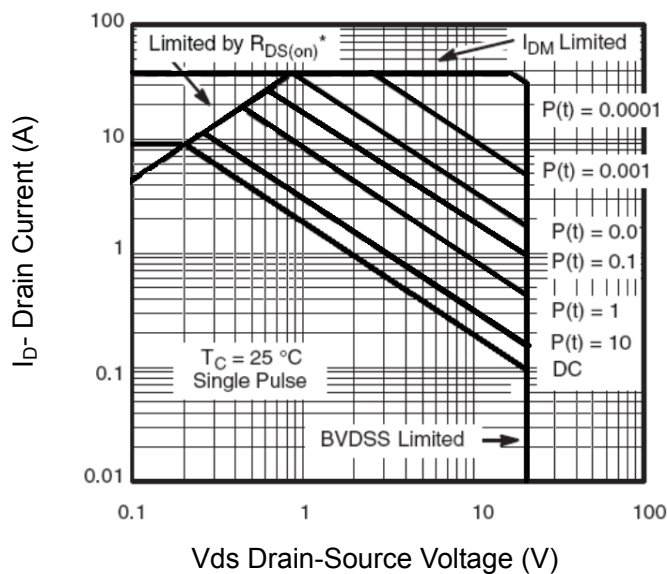


Figure 13 Safe Operation Area

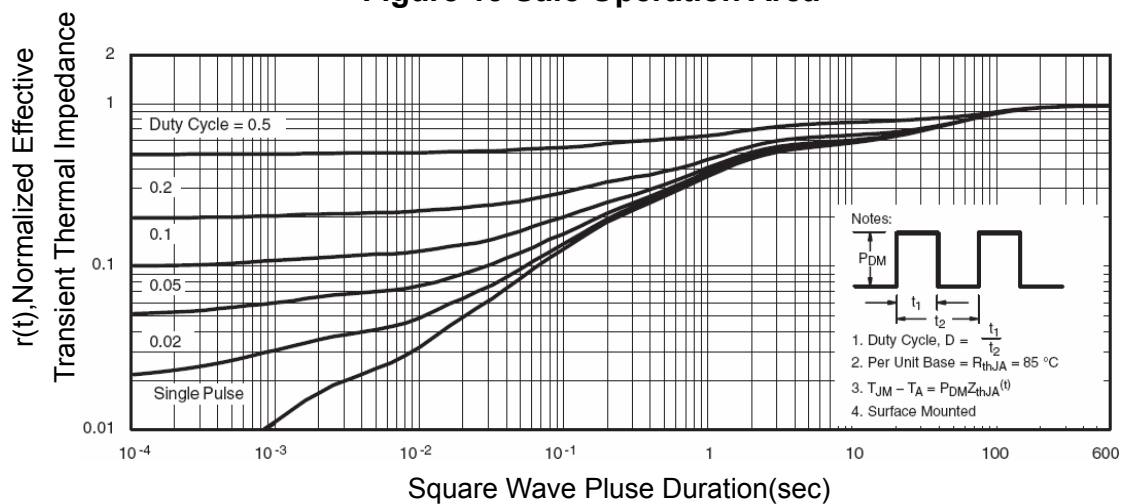
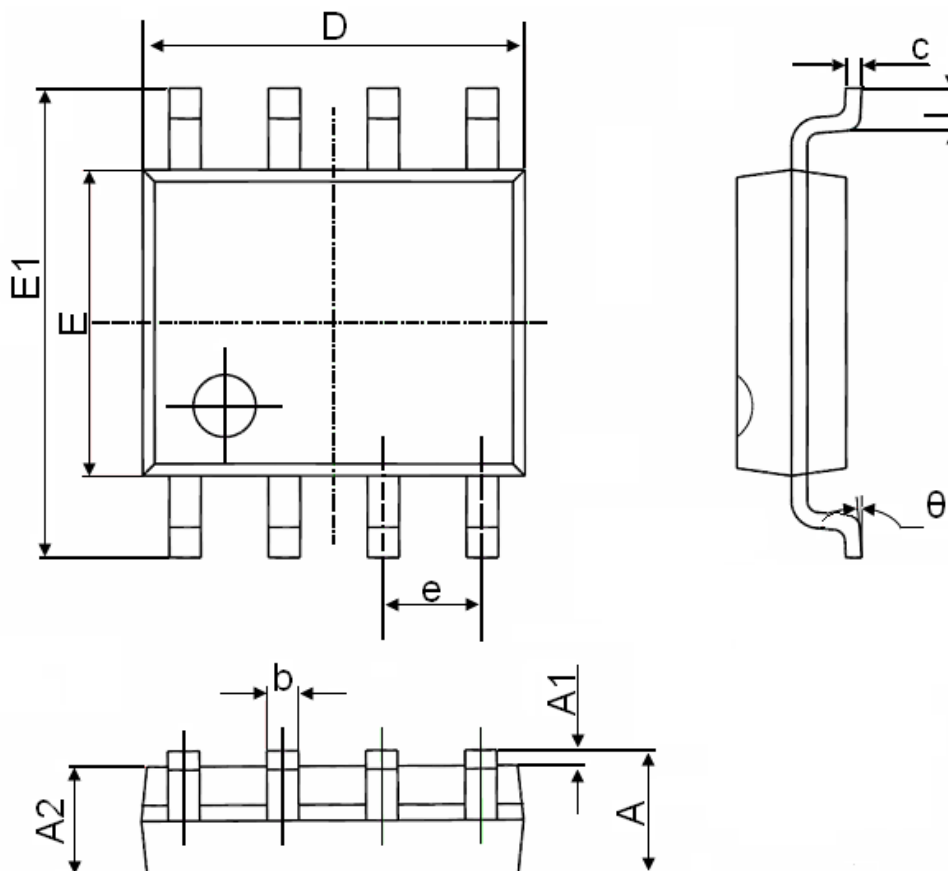


Figure 14 Normalized Maximum Transient Thermal Impedance

## SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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