

## Silicon P-Channel Power MOSFET

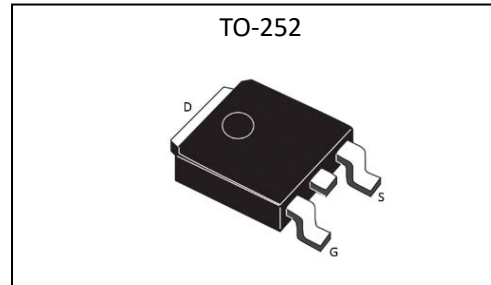
### General Description:

The HMR50P06 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the RoHS standard.

$V_{DSS}$	-60	V
$I_D$	-50	A
$P_D$	95	W
$R_{DS(ON)}$	28	m $\Omega$

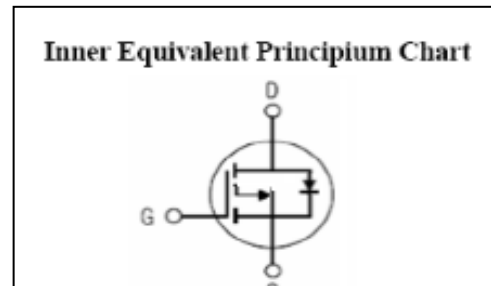
### Features:

- Fast Switching
- Low Gate Charge and Rdson
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test



### Applications:

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



### Absolute (Tc=25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	-60	V
$I_D$	Continuous Drain Current	-50	A
	Continuous Drain Current $T_C=100^\circ\text{C}$	-35	A
$I_{DM}^{a1}$	Pulsed Drain Current	-150	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$dv/dt^{a3}$	Peak Diode Recovery $dv/dt$	5.0	V/ns
$P_D$	Power Dissipation	95	W
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150, -55 to 150	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$

**Electrical Characteristics** (Tc=25°C unless otherwise specified):

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-60	--	--	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Bvdss Temperature Coefficient	I <sub>D</sub> =-250uA, Reference 25°C	--	0.15	--	V/°C
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> =-60, V <sub>GS</sub> = 0V, T <sub>a</sub> =25°C	--	--	-1	μA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> = 0V, T <sub>a</sub> =125°C	--	--	-250	
I <sub>GSS(F)</sub>	Gate to Source Forward Leakage	V <sub>GS</sub> = +20V	--	--	1	μA
I <sub>GSS(R)</sub>	Gate to Source Reverse Leakage	V <sub>GS</sub> =-20V	--	--	-1	μA

<b>ON Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20.0A	--	23	28	mΩ
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-3.5	-2.6	-2.0	V
Pulse width tp ≤ 380μs, δ ≤ 2%						

<b>Dynamic Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A	--	25	--	S
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V f=1.0MHz	--	6500	--	pF
C <sub>oss</sub>	Output Capacitance		--	720	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	535	--	

<b>Resistive Switching Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t <sub>d(ON)</sub>	Turn-on Delay Time	R <sub>L</sub> =-1.5Ω, V <sub>DD</sub> =-30V V <sub>GS</sub> =-10V, R <sub>G</sub> =1.5Ω	--	15	--	ns
t <sub>r</sub>	Rise Time		--	17	--	
t <sub>d(OFF)</sub>	Turn-Off Delay Time		--	40	--	
t <sub>f</sub>	Fall Time		--	45	--	
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =-20.0A, V <sub>DD</sub> =-30V V <sub>GS</sub> =-10V	--	75	--	nC
Q <sub>gs</sub>	Gate to Source Charge		--	16	--	
Q <sub>gd</sub>	Gate to Drain ( "Miller" ) Charge		--	19	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_S$	Continuous Source Current (Body Diode)		--	--	-50	A
$I_{SM}$	Maximum Pulsed Current (Body Diode)		--	--	-150	A
$V_{SD}$	Diode Forward Voltage	$I_S = -50A, V_{GS} = 0V$	--	--	1.5	V
$t_{rr}$	Reverse Recovery Time	$I_S = -50A, T_j = 25^\circ C$	--	50	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di_f/dt = 100A/us, V_{GS} = 0V$	--	110	--	nC
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	104	$^\circ C/W$

<sup>a1</sup>: Repetitive rating; pulse width limited by maximum junction temperature

<sup>a3</sup>:  $I_{SD} = -50A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, Start T_j = 25^\circ C$

### Typical Electrical and Thermal Characteristics

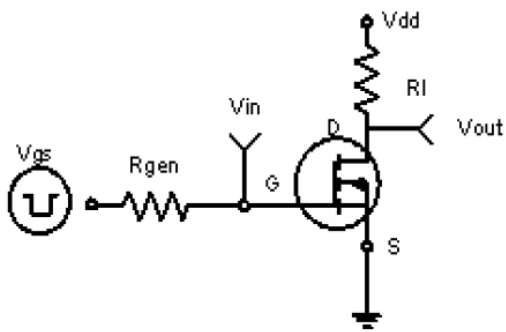


Figure 1: Switching Test Circuit

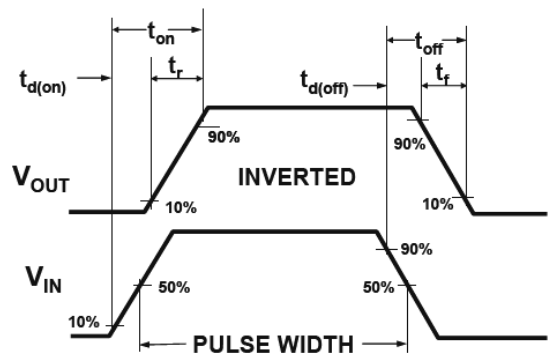


Figure 2: Switching Waveforms

Typical Electrical and Thermal Characteristics (Curves)

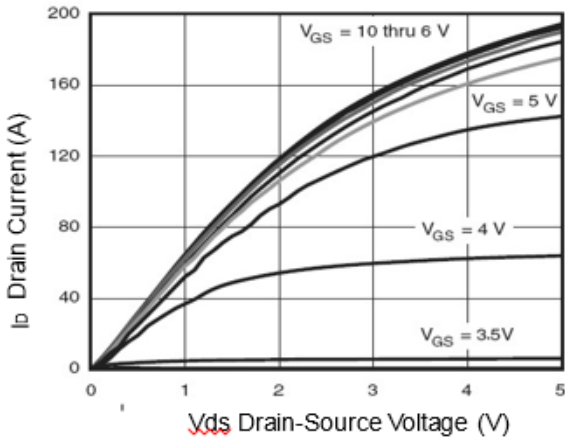


Figure 1 Output Characteristics

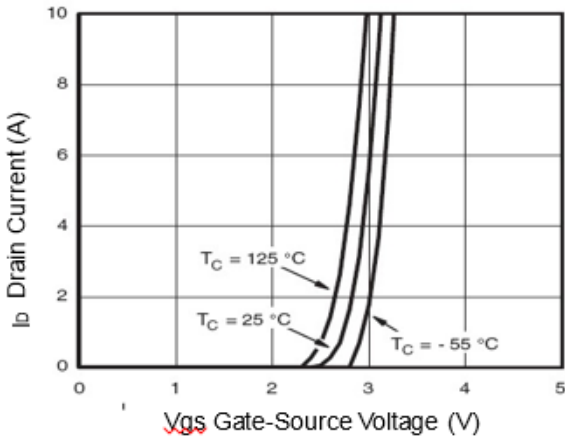


Figure 2 Transfer Characteristics

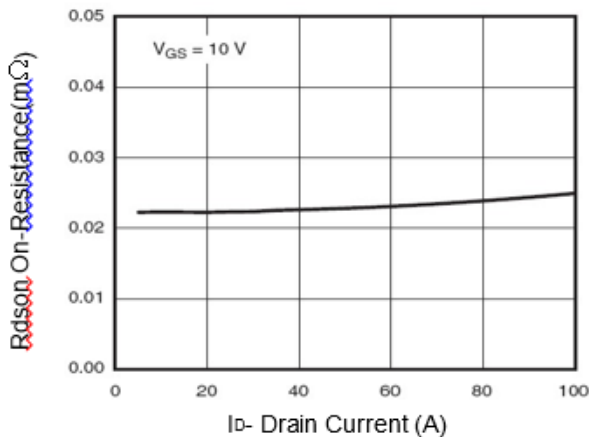


Figure 3  $R_{DS(on)}$ - Drain Current

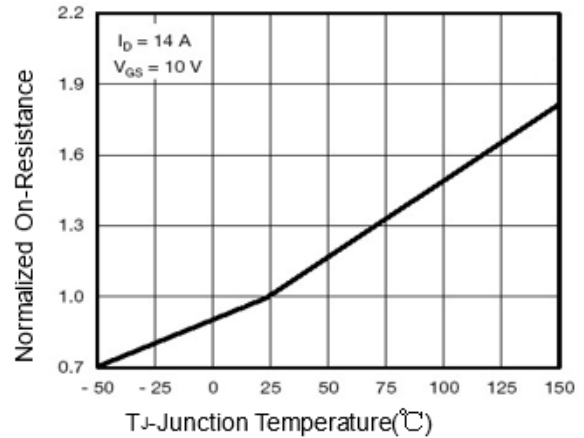


Figure 4  $R_{DS(on)}$ -Junction Temperature

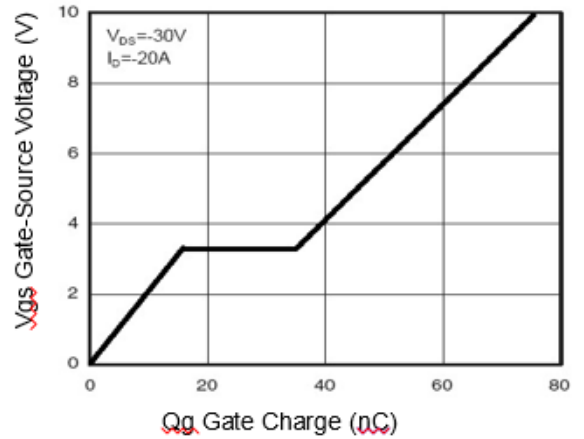


Figure 5 Gate Charge

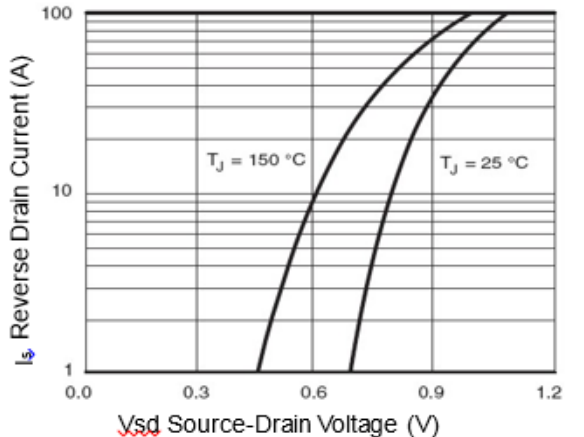


Figure 6 Source- Drain Diode Forward

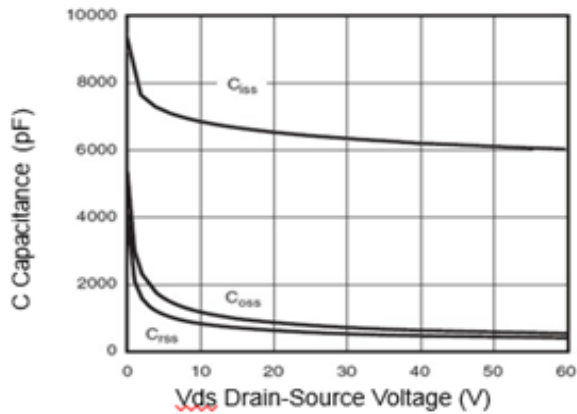


Figure 7 Capacitance vs Vds

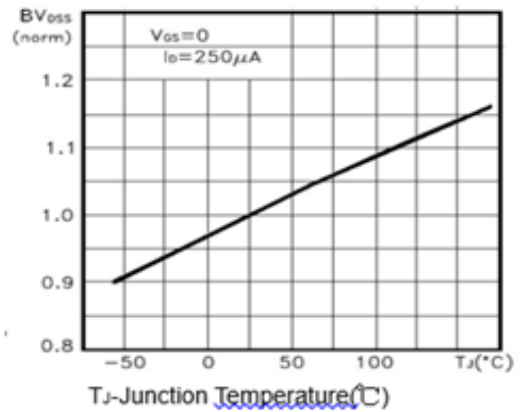


Figure 9  $BV_{DSS}$  vs Junction Temperature

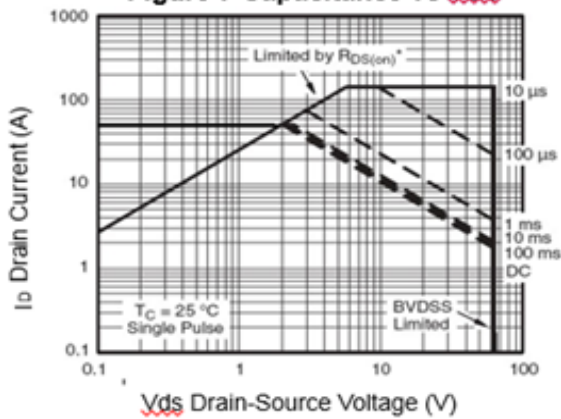


Figure 8 Safe Operation Area Figure 10  $I_D$  Current Derating vs Junction Temperature

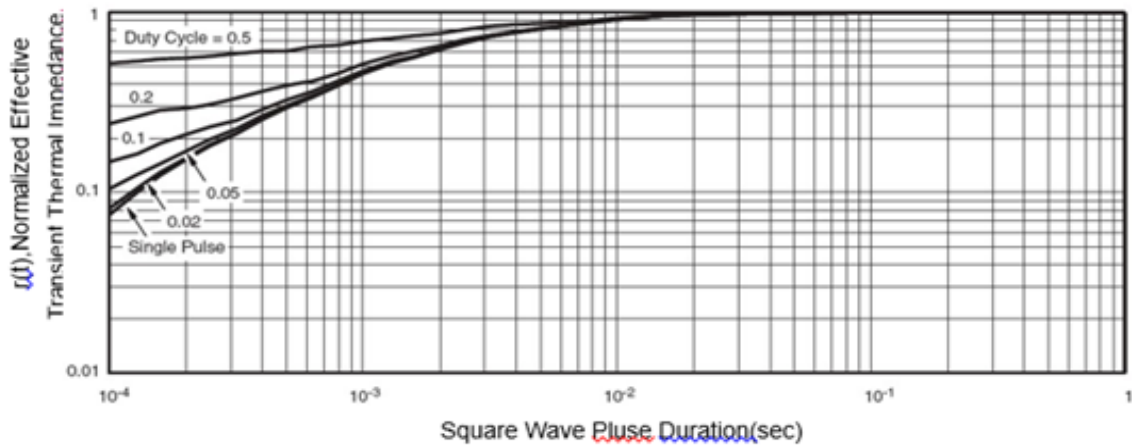
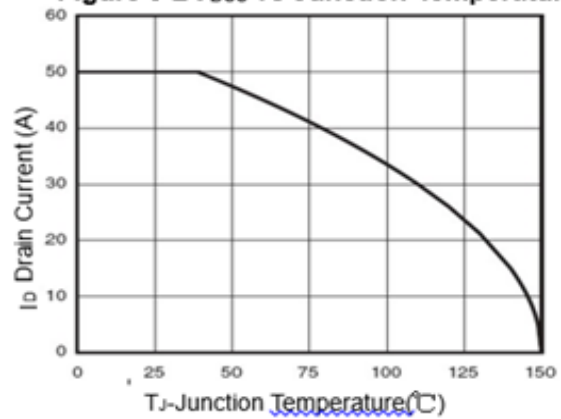


Figure 11 Normalized Maximum Transient Thermal Impedance