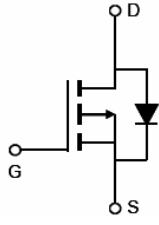

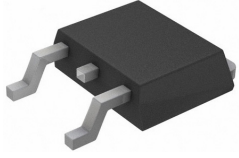


P-Channel Enhancement Mode Power MOSFET

<p><b>Description</b> The HM25P04K uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math>. This device is suitable for use as a load switch or in PWM applications.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS} = -40V, I_D = -25A</math> <math>R_{DS(ON)} &lt; 42m\Omega @ V_{GS} = -10V</math> <math>R_{DS(ON)} &lt; 70m\Omega @ V_{GS} = -4.5V</math></li> <li>● High power and current handing capability</li> <li>● Lead free product is acquired</li> <li>● Surface mount package</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● PWM applications</li> <li>● Load switch</li> <li>● Uninterruptible power supply</li> </ul>	<div style="text-align: center;">  <p><b>Schematic diagram</b></p>  <p><b>Marking and pin assignment</b></p>  <p><b>TO-252-2L top view</b></p> </div>
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**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM25P04K	HM25P04K	TO-252-2L	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-25	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	100	A
Maximum Power Dissipation	$P_D$	30	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

**Thermal Characteristic**

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	40	$^\circ C/W$
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**Electrical Characteristics ( $T_A=25^\circ C$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-44	-	V

Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (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	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-25A$	-	30	42	m $\Omega$
		$V_{GS}=-4.5V, I_D=-6A$	-	49	70	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-25A$	30	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	$C_{ISS}$	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	2900	-	PF
Output Capacitance	$C_{OSS}$		-	410	-	PF
Reverse Transfer Capacitance	$C_{RSS}$		-	280	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-25A,$ $V_{GS}=-10V, R_{GEN}=3\Omega$	-	15	-	nS
Turn-on Rise Time	$t_r$		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	44	-	nS
Turn-Off Fall Time	$t_f$		-	21	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-25A, V_{GS}=-10V$	-	48	-	nC
Gate-Source Charge	$Q_{gs}$		-	12	-	nC
Gate-Drain Charge	$Q_{gd}$		-	14	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-2A$	-	-	-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

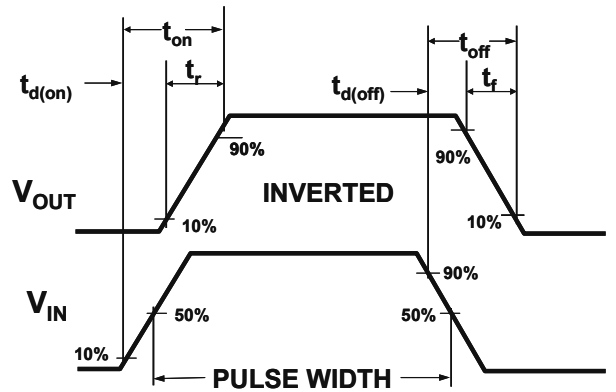


Figure 2 Switching Waveforms

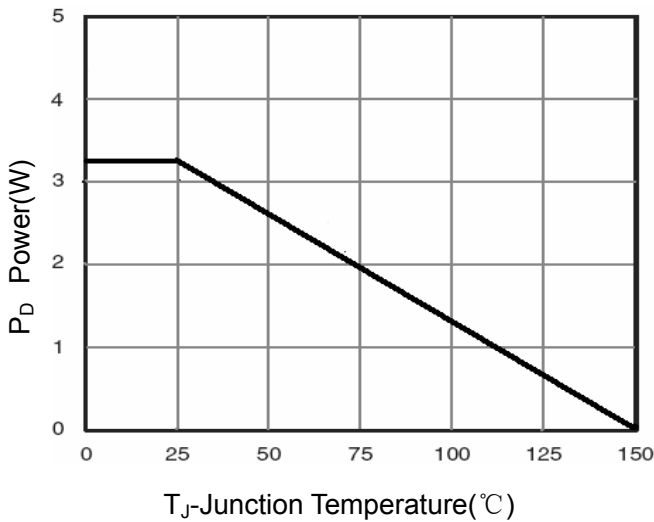


Figure 3 Power Dissipation

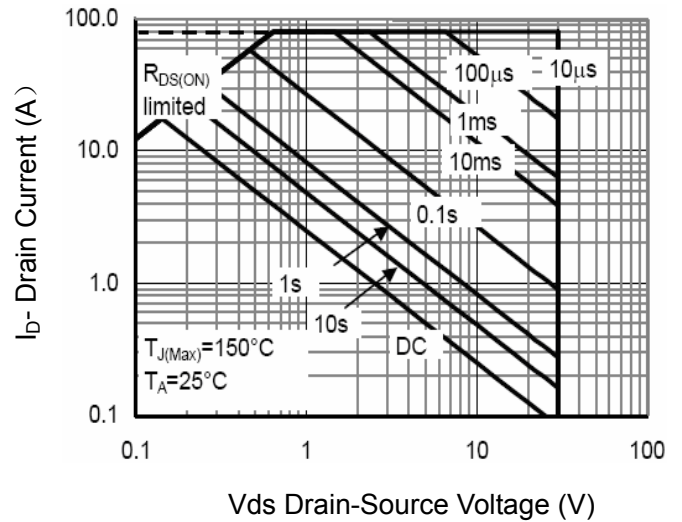


Figure 4 Safe Operation Area

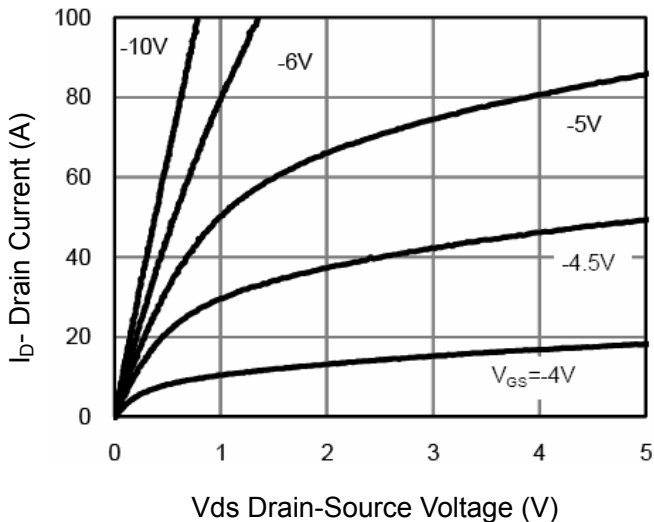


Figure 5 Output Characteristics

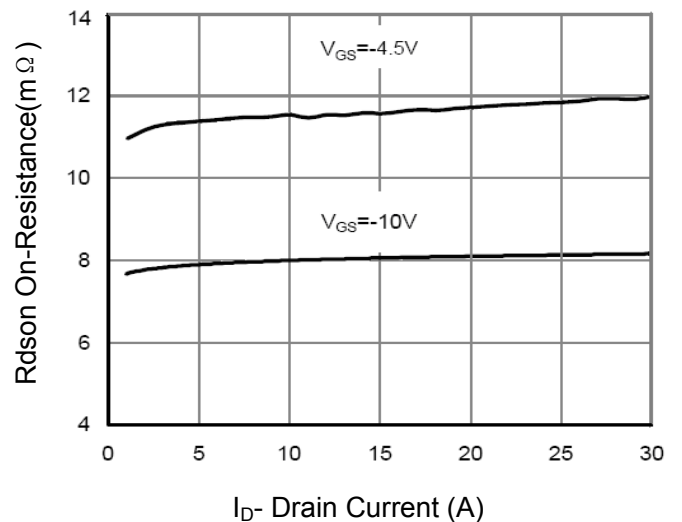
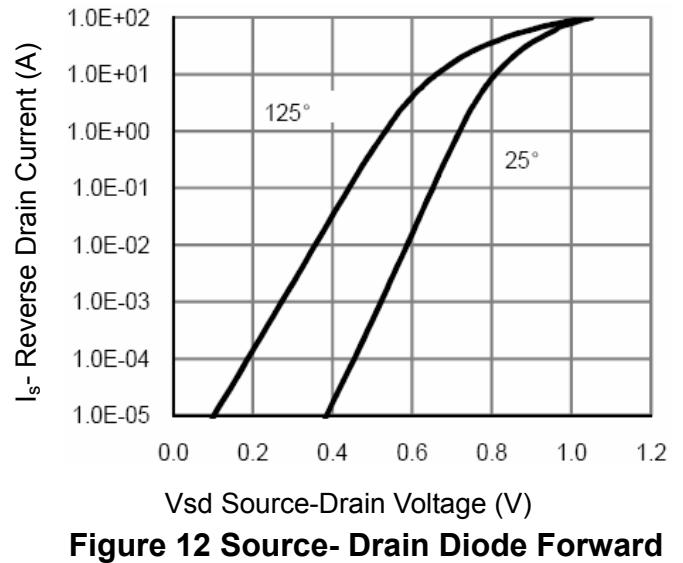
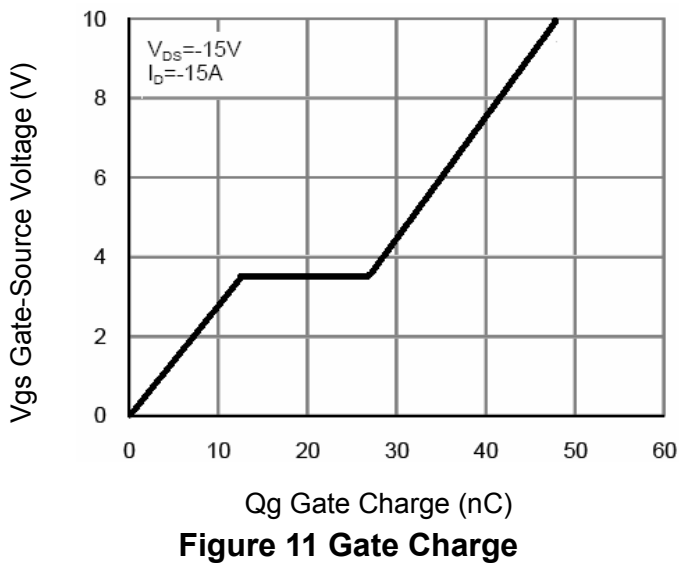
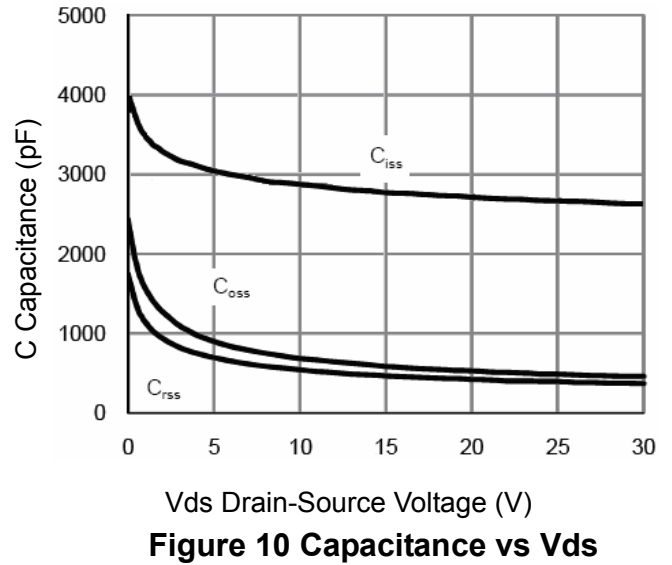
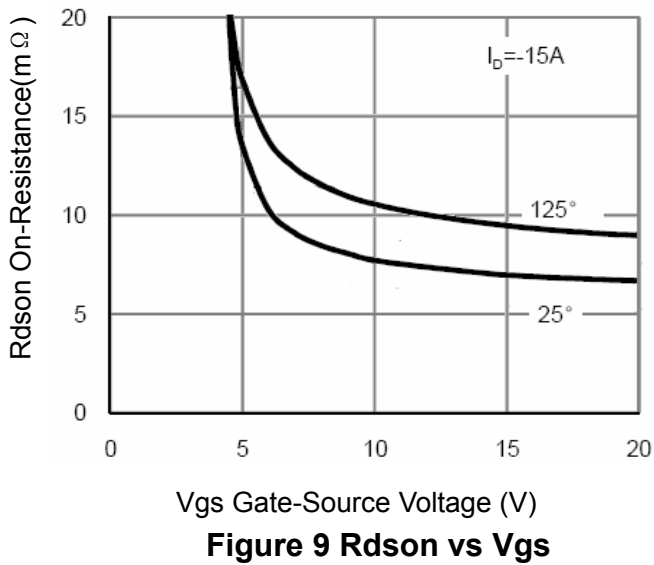
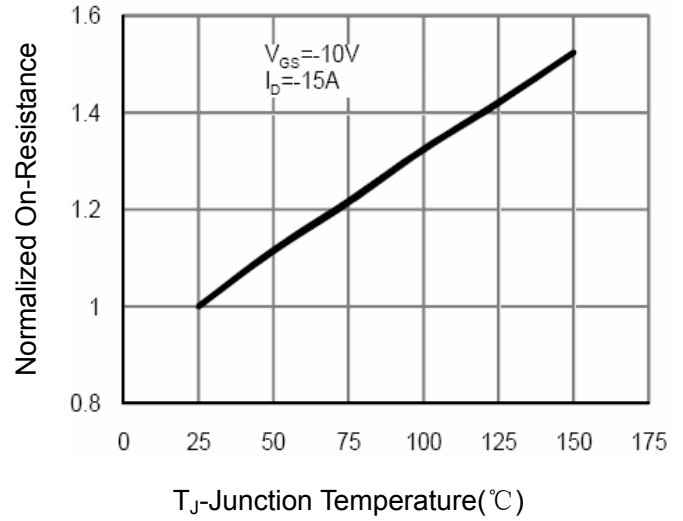
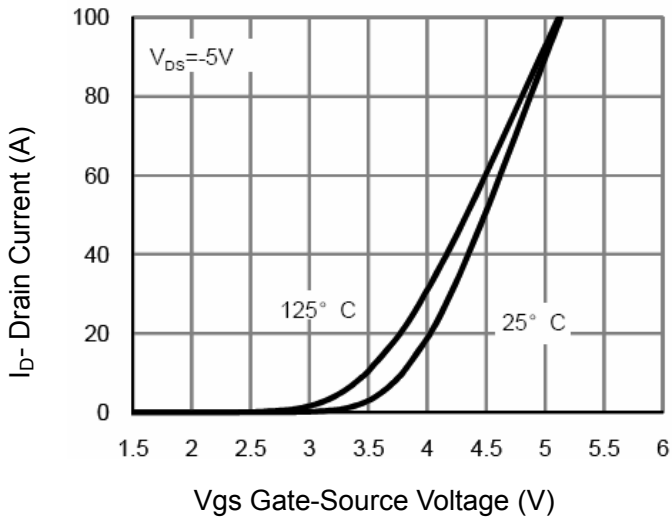


Figure 6 Drain-Source On-Resistance



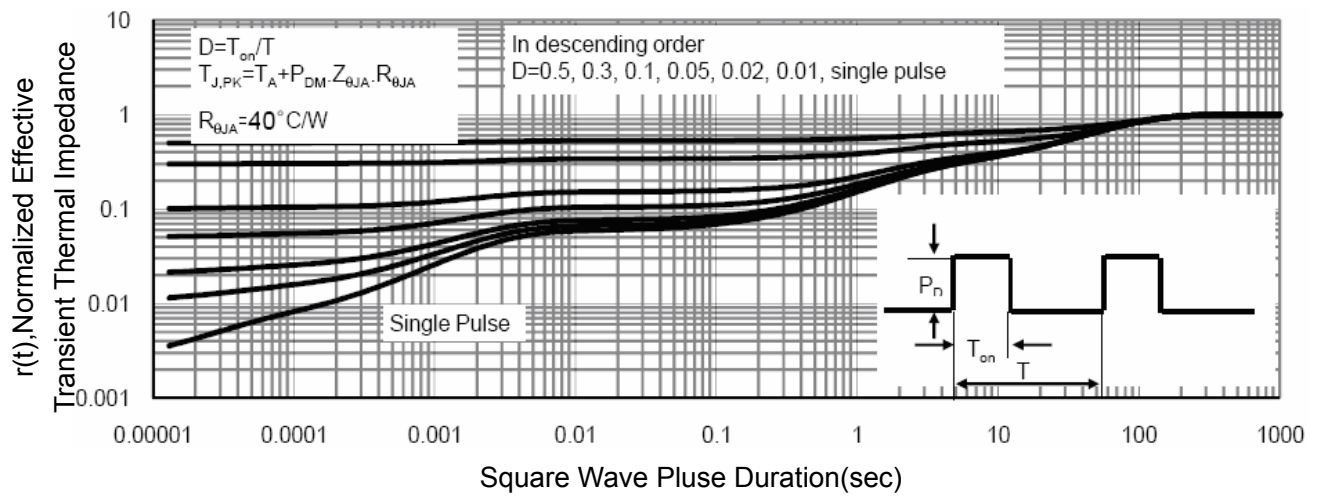
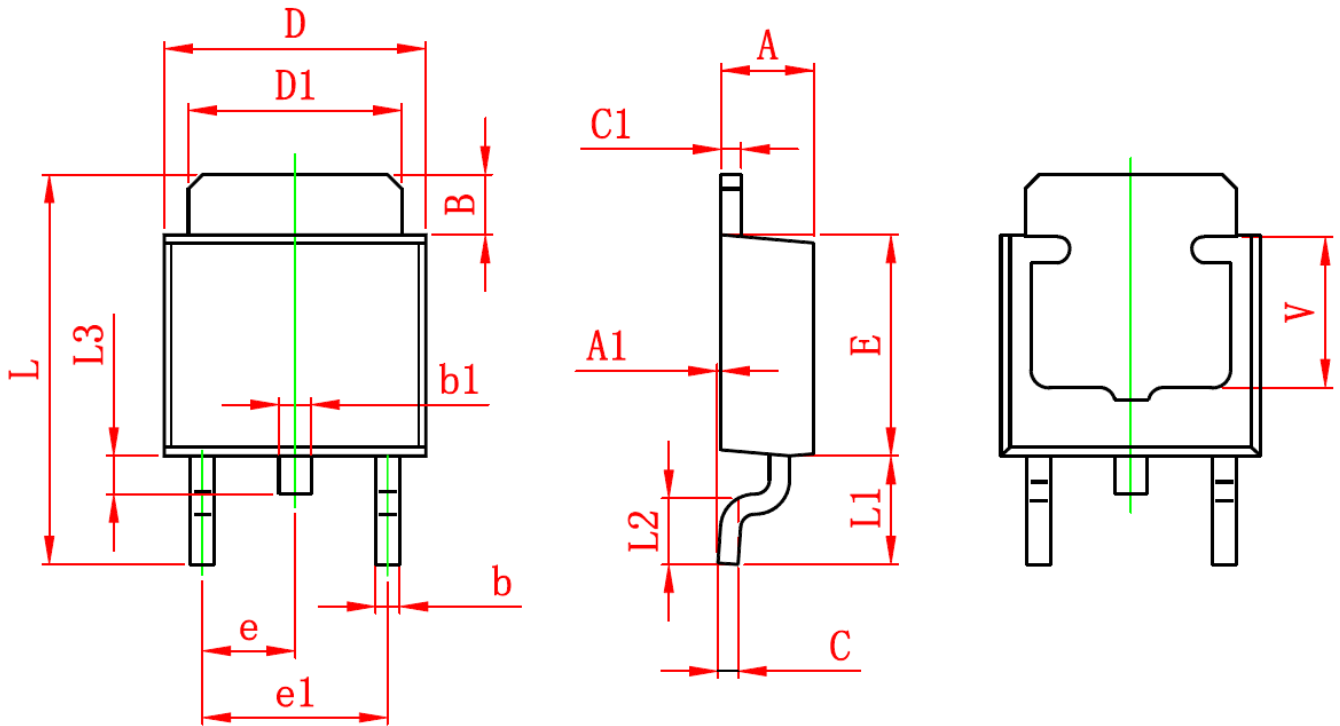


Figure 13 Normalized Maximum Transient Thermal Impedance

TO-252-2L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.600	0.900	0.024	0.035
V	3.800 REF.		0.150 REF.	