

P-Channel Enhancement Mode Power MOSFET

Description

The HM40P04K uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge .This device is well suited for high current load applications.

General Features

- V_{DS} =-40V,I_D =-40A
 R_{DS(ON)} <14mΩ @ V_{GS}=-10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

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

100% UIS TESTED!

100% ΔVds TESTED!

Schematic diagram Generatic diagram HM40P04K HM40P04K Generatic Schematic Schemati

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TO-252-2L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
HM40P04K	HM40P04K	TO-252-2L	-	-	-

Absolute Maximum Ratings (T_c=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	Vds	-40	V
Gate-Source Voltage	Vgs	±20	V
Drain Current-Continuous	I _D	-40	А
Drain Current-Continuous(T _C =100 ℃)	I _D (100℃)	-25	А
Pulsed Drain Current	I _{DM}	-50	А
Maximum Power Dissipation	PD	80	W
Derating factor		0.53	W/℃
Single pulse avalanche energy (Note 5)	E _{AS}	544	mJ
Operating Junction and Storage Temperature Range	T _J ,T _{STG}	-55 To 175	°C



Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{ ext{ hetaJC}}$	1.88	°C/W

Electrical Characteristics (Tc=25[°]C unless otherwise noted)

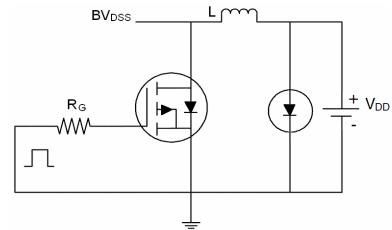
Parameter	Symbol	Condition	Min	Тур	Max	Unit
Off Characteristics		·	•	•		
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =-250µA	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V,V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)		·	•	•		
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_{D}=-250\mu A$	-1.5	-1.9	-3.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-12A	-	10	14	mΩ
Forward Transconductance	g fs	V _{DS} =-5V,I _D =-12A	34	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{lss}		-	2960	-	PF
Output Capacitance	C _{oss}	V _{DS} =-20V,V _{GS} =0V,	-	370	-	PF
Reverse Transfer Capacitance	C _{rss}	F=1.0MHz	-	310	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}		-	10	-	nS
Turn-on Rise Time	t _r	V _{DD} =-20V,I _D =-20A	-	18	-	nS
Turn-Off Delay Time	t _{d(off)}	V _{GS} =-10V,R _G =3Ω	-	38	-	nS
Turn-Off Fall Time	t _f		-	24	-	nS
Total Gate Charge	Qg	V 001 101	-	72		nC
Gate-Source Charge	Q _{gs}	V_{DS} =-20,I _D =-12A,	-	14		nC
Gate-Drain Charge	Q _{gd}	V _{GS} =-10V	-	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)	Is		-	-	-40	А
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF =- 20A	-	40		nS
Reverse Recovery Charge	Qrr	di/dt = -100A/µs ^(Note3)	-	42		nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD				y LS+LD)

Notes:

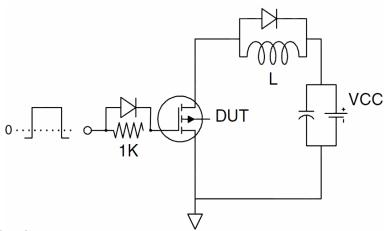
- 1. Repetitive Rating: Pulse width limited by maximum junction temperature.
- **2.** Surface Mounted on FR4 Board, $t \le 10$ sec.
- **3.** Pulse Test: Pulse Width \leq 300µs, Duty Cycle \leq 2%.
- 4. Guaranteed by design, not subject to production
- **5.** E_{AS} condition: Tj=25 °C, V_{DD} =-20V, V_{G} =-10V, L=1mH, Rg=25 Ω , I_{AS} =33A



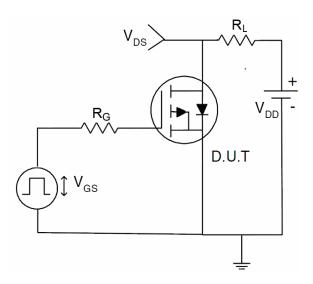
Test Circuit 1) E_{AS} Test Circuit



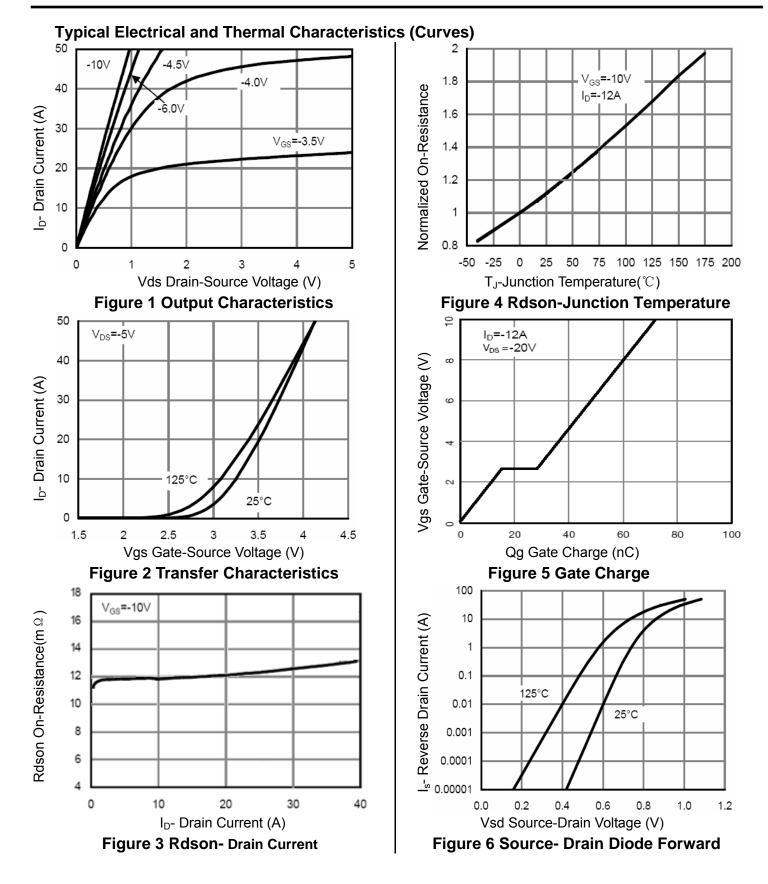
2) Gate Charge Test Circuit



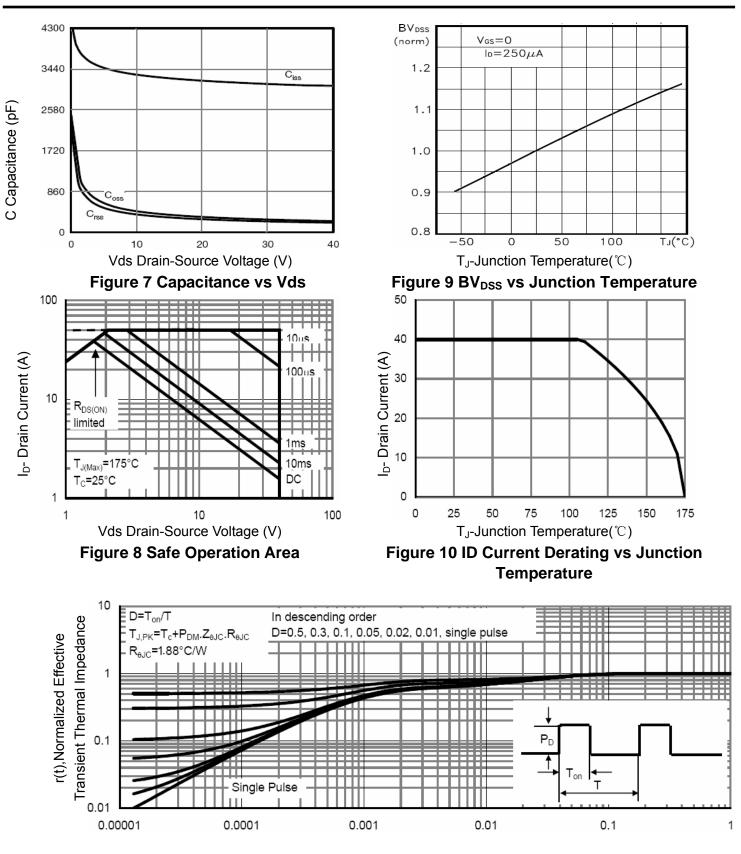
3) Switch Time Test Circuit







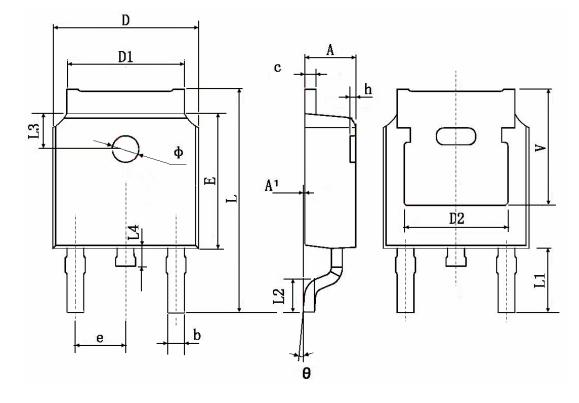




Square Wave Pluse Duration(sec) Figure 11 Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



Symbol	Dimensions	In Millimeters	Dimensions In Inches			
Symbol	Min.	Max.	Min.	Max.		
А	2.200	2.400	0.087	0.094		
A1	0.000	0.127	0.000	0.005		
b	0.660	0.860	0.026	0.034		
С	0.460	0.580	0.018	0.023		
D	6.500	6.700	0.256	0.264		
D1	5.100	5.460	0.201	0.215		
D2	0.483	B TYP.	0.190 TYP.			
E	6.000	6.200	0.236	0.244		
е	2.186	2.386	0.086	0.094		
L	9.800	10.400	0.386	0.409		
L1	2.900 TYP.		0.114 TYP.			
L2	1.400	1.700	0.055	0.067		
L3	1.600	1.600 TYP.		TYP.		
L4	0.600	1.000	0.024	0.039		
Φ	1.100	1.300	0.043	0.051		
θ	0°	8°	0°	8°		
h	0.000	0.300	0.000	0.012		
V	5.350) TYP.	0.211	0.211 TYP.		



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