



Description

The HTK50P04M1 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 40V$ $I_D = 60A$

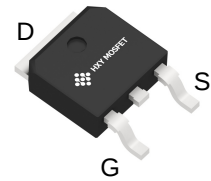
$R_{DS(ON)} < 8.5m\Omega$ @ $V_{GS}=10V$

Application

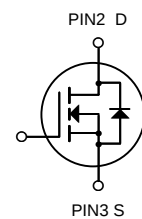
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
HTK50P04M1	TO252-2L	HXY MOSFET	2500

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V ¹	60	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ 10V ¹	45	A
I_{DM}	Pulsed Drain Current ²	220	A
EAS	Single Pulse Avalanche Energy ³	416.1	mJ
I_{AS}	Avalanche Current	39	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ⁴	64.6	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	62	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.8	$^{\circ}C/W$



Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	45	-	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 =250μA	1.2	1.6	2.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	7.0	8.5	mΩ
		V _{GS} =4.5V, I _D =20A		15	18	
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A	15	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =20V, V _{GS} =0V, F=1.0MHz	-	1800	-	PF
Output Capacitance	C _{OSS}		-	280	-	PF
Reverse Transfer Capacitance	C _{rSS}		-	190	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V, I _D =2A, R _L =1Ω V _{GS} =10V, R _G =3Ω	-	6.4	-	nS
Turn-on Rise Time	t _r		-	17.2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	29.6	-	nS
Turn-Off Fall Time	t _f		-	16.8	-	nS
Total Gate Charge	Q _g	V _{DS} =20V, I _D =20A, V _{GS} =10V	-	29		nC
Gate-Source Charge	Q _{gs}		-	4.5		nC
Gate-Drain Charge	Q _{gd}		-	6.4		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =10A	-		1.2	V
Diode Forward Current (Note 2)	I _S		-	-	68	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 20A	-	29	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs(Note3)	-	26	-	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, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : $T_J=25^{\circ}\text{C}, V_{DD}=20V, V_G=10V, L=1mH, R_g=25\Omega$.



Typical Electrical and Thermal Characteristics (Curves)

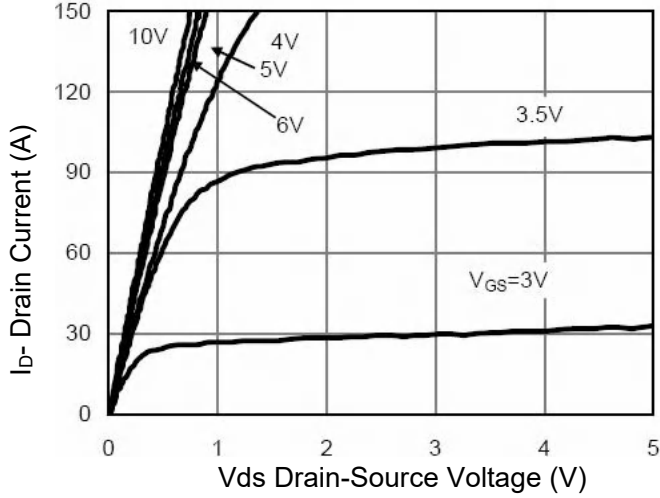


Figure 1 Output Characteristics

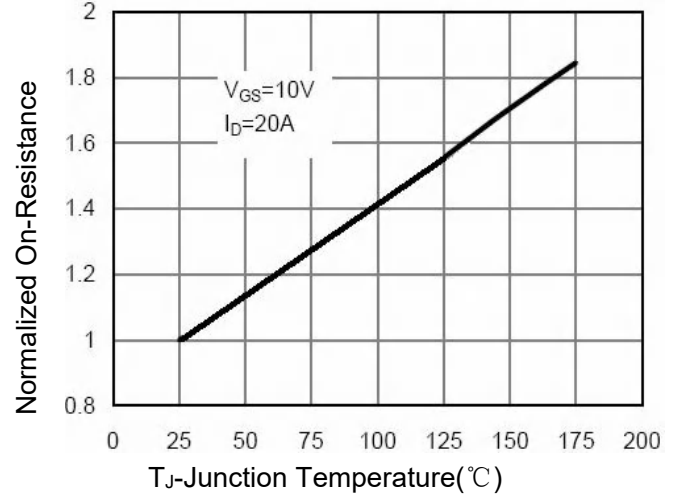


Figure 4 Rdson-Junction Temperature

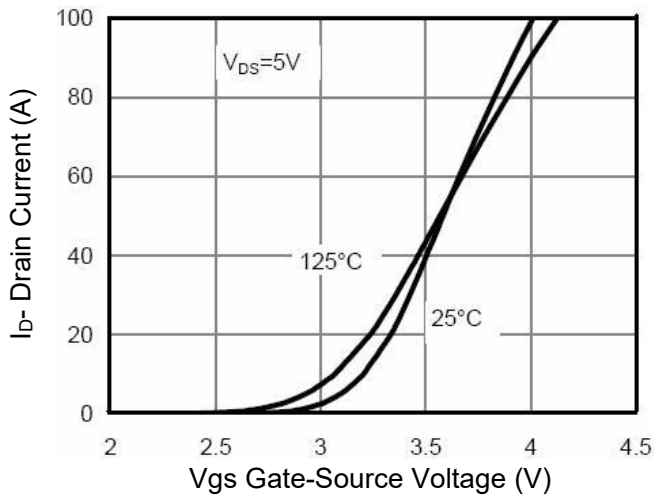


Figure 2 Transfer Characteristics

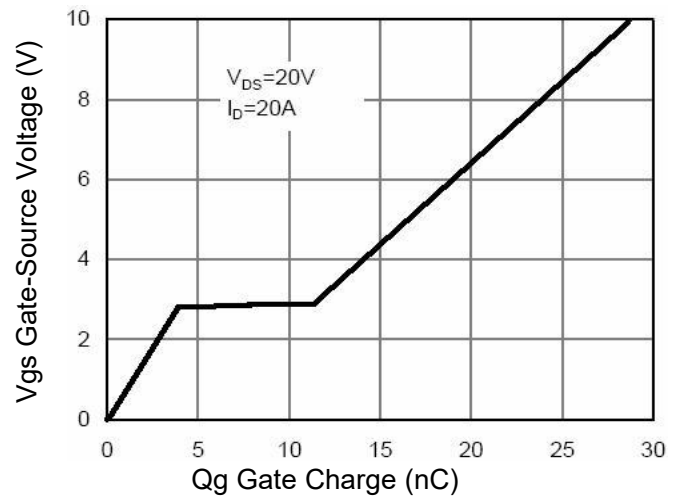


Figure 5 Gate Charge

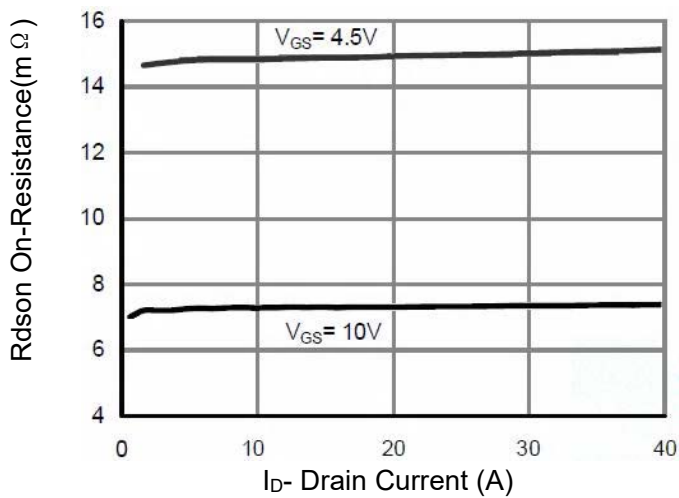


Figure 3 Rdson- Drain Current

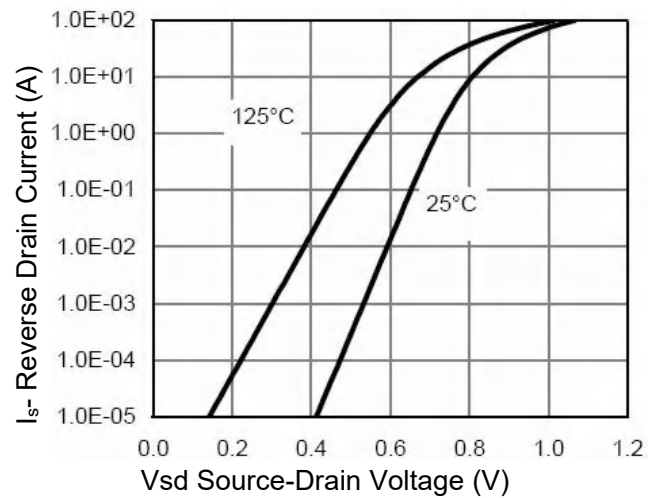


Figure 6 Source- Drain Diode Forward

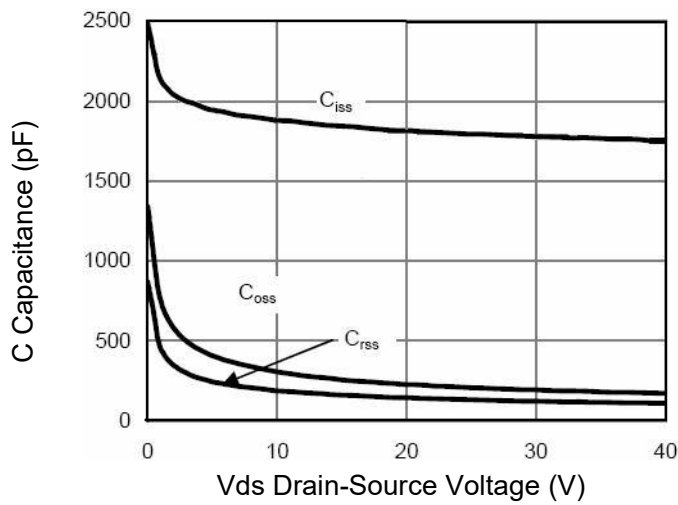


Figure 7 Capacitance vs Vds

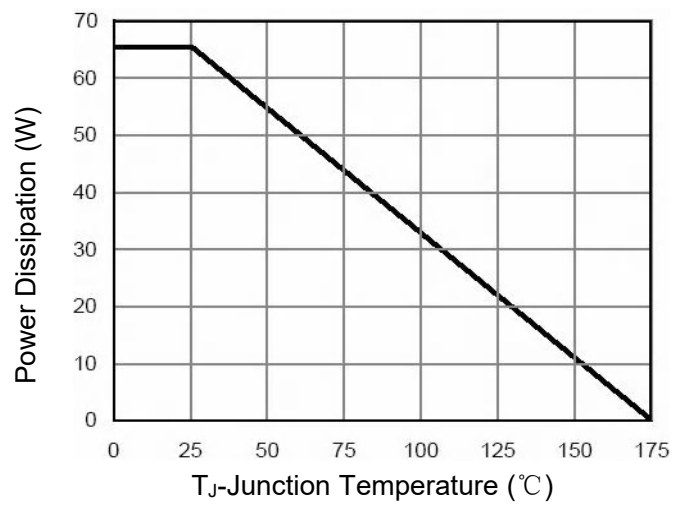


Figure 9 Power De-rating

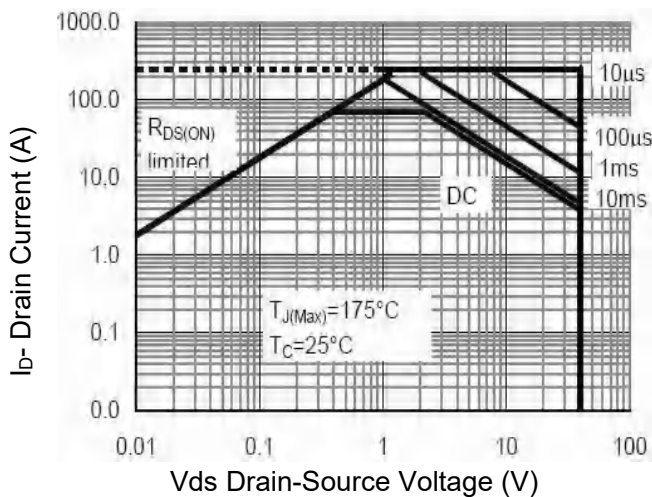


Figure 8 Safe Operation Area

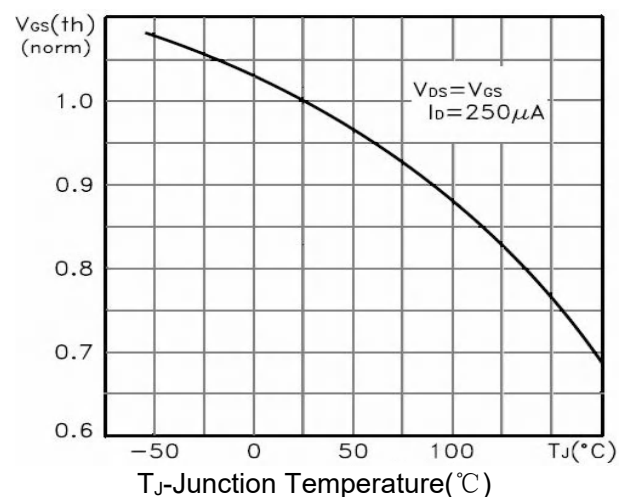


Figure 10 $V_{GS(th)}$ vs Junction Temperature

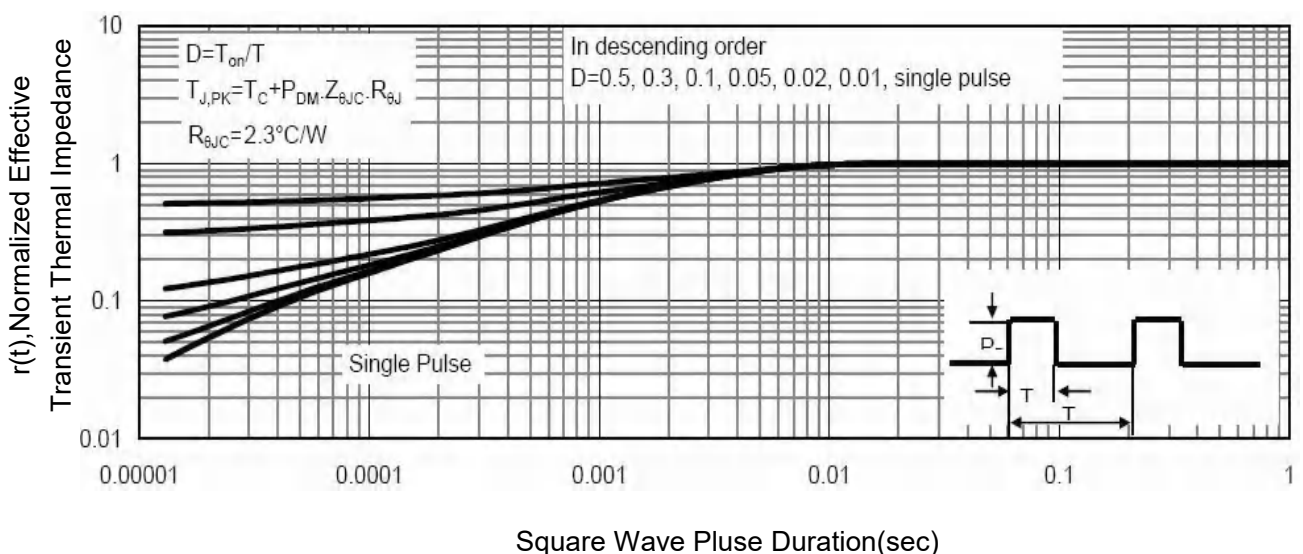


Figure 11 Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



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	0.660	0.860	0.026	0.034
c	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 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	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 TYP.		0.063 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 TYP.	



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