

N-Channel Enhancement Mode Power MOSFET

Description

The PTÎ \Leftrightarrow S uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = 40V, I_{D} = 60A$ $R_{DS(ON)} < 13m\Omega @ V_{GS} = 10V$
- 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
- Special process technology for high ESD capability

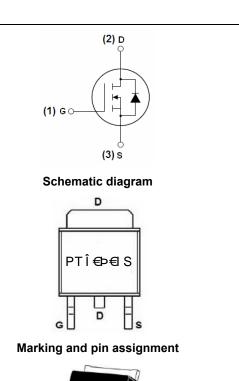
Application

- Load switching
- Hard switched and high frequency circuits

Uninterruptible power supply



100% ΔVds TESTED!





TO-252-2L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
PTÎ⊕€S	PT΀ހIS	TO-252-2L	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	40	V
Gate-Source Voltage	V _G s	±20	V
Drain Current-Continuous	I _D	60	А
Drain Current-Continuous(T _C =100 °C)	I _D (100℃)	42	Α
Pulsed Drain Current	I _{DM}	200	Α
Maximum Power Dissipation	P _D	65	W
Derating factor		0.43	W/℃
Single pulse avalanche energy (Note 5)	E _{AS}	400	mJ
Operating Junction and Storage Temperature Range	T_{J}, T_{STG}	-55 To 175	$^{\circ}$



Thermal Characteristic

Electrical Characteristics (T_C=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	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)}	$V_{DS}=V_{GS}$, $I_{D}=250\mu A$	1.2	1.6	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	7.3	13	mΩ
Forward Transconductance	g FS	V _{DS} =10V,I _D =20A	15	-	-	S
Dynamic Characteristics (Note4)	<u>.</u>					
Input Capacitance	C _{lss}	\/ -20\/\/ -0\/	-	1800	-	PF
Output Capacitance	C _{oss}	V_{DS} =20V, V_{GS} =0V, F=1.0MHz	-	280	-	PF
Reverse Transfer Capacitance	C _{rss}	F=1.0IVID2	-	190	-	PF
Switching Characteristics (Note 4)	<u>.</u>					
Turn-on Delay Time	t _{d(on)}		-	6.4	-	nS
Turn-on Rise Time	t _r	V_{DD} =20 V , I_D =2 A , R_L =1 Ω	-	17.2	-	nS
Turn-Off Delay Time	t _{d(off)}	V_{GS} =10 V , R_{G} =3 Ω	-	29.6	-	nS
Turn-Off Fall Time	t _f		-	16.8	-	nS
Total Gate Charge	Qg	\/ -20\/ L -20 A	-	29		nC
Gate-Source Charge	Q _{gs}	$V_{DS}=20V,I_{D}=20A,$ $V_{GS}=10V$	-	4.5		nC
Gate-Drain Charge	Q_{gd}	V _{GS} -10V	-	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)	Is		-	-	60	Α
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 20A	-	29	-	nS
Reverse Recovery Charge	Qrr	$di/dt = 100A/\mu s^{(Note3)}$	-	26	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

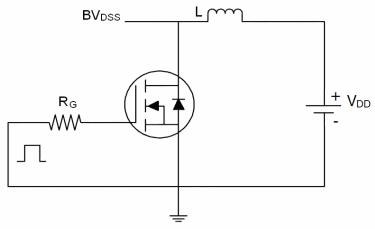
Notes:

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

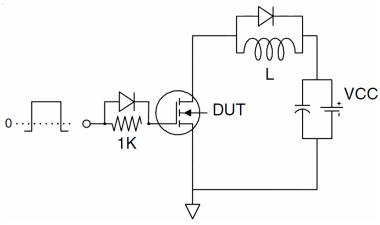


Test circuit

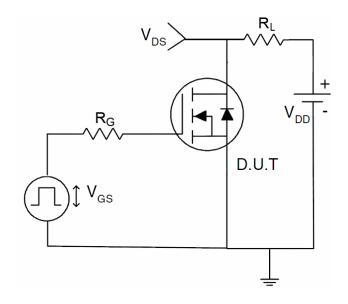
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit





Typical Electrical and Thermal Characteristics (Curves)

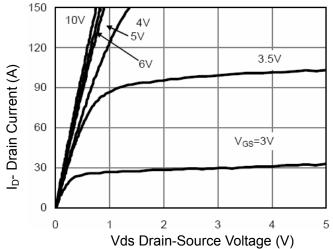


Figure 1 Output Characteristics

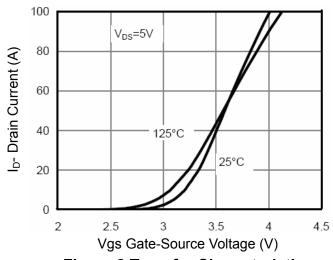


Figure 2 Transfer Characteristics

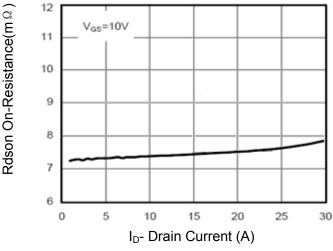


Figure 3 Rdson- Drain Current

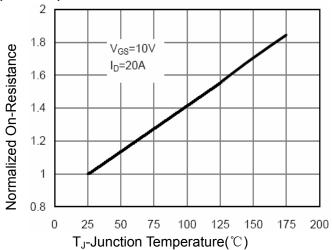


Figure 4 Rdson-JunctionTemperature

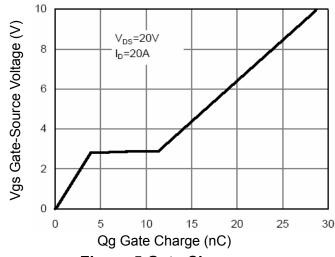


Figure 5 Gate Charge

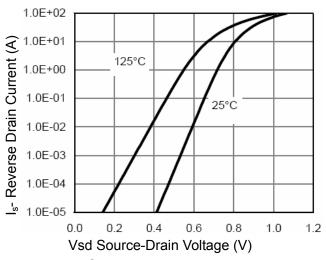
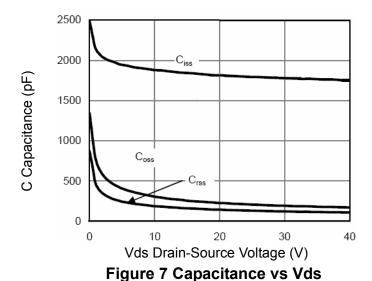
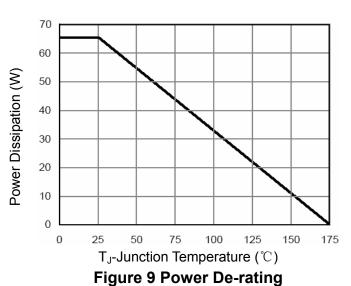
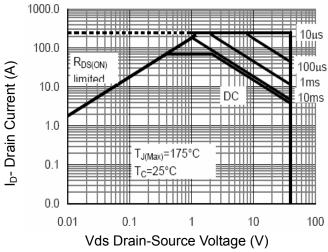


Figure 6 Source- Drain Diode Forward









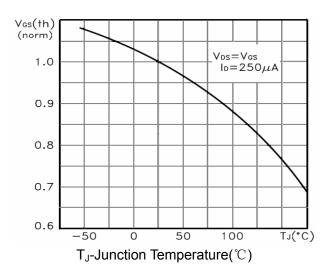


Figure 8 Safe Operation Area

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

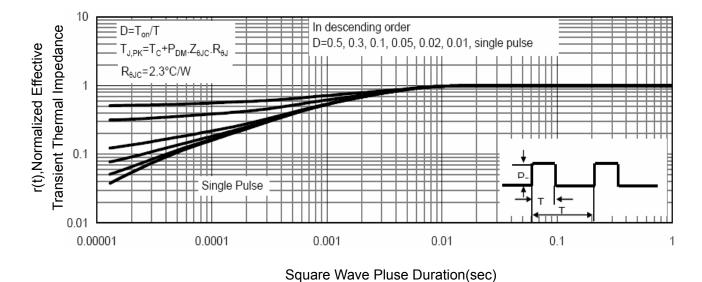
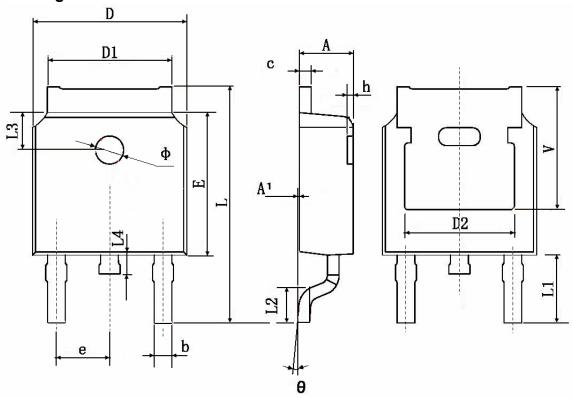


Figure 11 Normalized Maximum Transient Thermal Impedance



TO-252 Package Information



Cumbal	Dimensions	In Millimeters	meters Dimensions In Inches			
Symbol	Min.	Max.	Min.	Max.		
Α	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	0.48	3 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	2.90	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		
Ф	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 T		TYP.			



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