

PTD50N06

60V/50A N-Channel Advanced Power MOSFET

Features

- ◆ Low On-Resistance
- ◆ Fast Switching
- ◆ 100% Avalanche Tested
- ◆ Repetitive Avalanche Allowed up to T_j max
- ◆ Lead-Free, RoHS Compliant

Description

PTD50N06 designed by the trench process techniques to achieve extremely low on-resistance. Additional features of this design can operate at high junction temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Motor applications and a wide variety of other applications.

General Features

- ◆ $V_{DS} = 60V, I_D = 50A$
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = 10V$

D

G S

TO-252-2L

Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_a) is 25°C, unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	50	A
Drain Current-Continuous($T_c=100^\circ C$)	$I_D(100^\circ C)$	35.4	A
Pulsed Drain Current	I_{DM}	200	A
Maximum Power Dissipation	P_D	85	W
Derating factor		0.57	W/°C
Single pulse avalanche energy ^(Note 5)	E_{AS}	300	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C
Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	1.8	°C/W

PTD50N06**60V/50A N-Channel Advanced Power MOSFET****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}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	1.9	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	14	20	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=20A$	18	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V,$ $F=1.0MHz$	-	2050	-	PF
Output Capacitance	C_{oss}		-	158	-	PF
Reverse Transfer Capacitance	C_{rss}		-	120	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, R_L=6.7\Omega$ $V_{GS}=10V, R_G=3\Omega$	-	7.4	-	nS
Turn-on Rise Time	t_r		-	5.1	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28.2	-	nS
Turn-Off Fall Time	t_f		-	5.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=20A,$ $V_{GS}=10V$	-	50		nC
Gate-Source Charge	Q_{gs}		-	6		nC
Gate-Drain Charge	Q_{gd}		-	15		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-		1.2	V
Diode Forward Current	I_S		-	-	50	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu\text{s}$ (Note 3)	-	28	-	nS
Reverse Recovery Charge	Q_{rr}		-	40	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Typical Electrical and Thermal Characteristics (Curves)

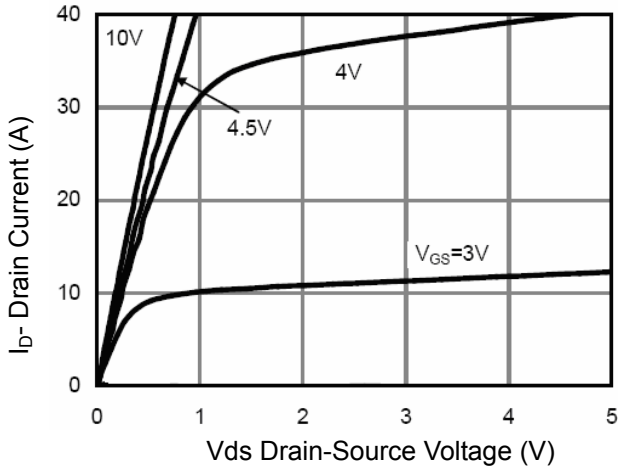


Figure 1 Output Characteristics

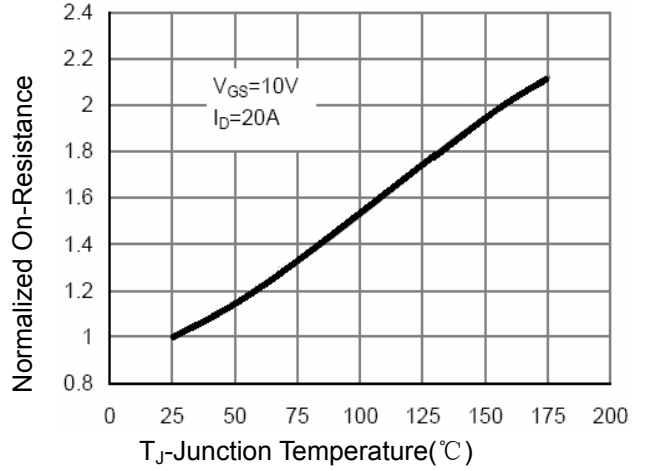


Figure 4 R_{dson} -Junction Temperature

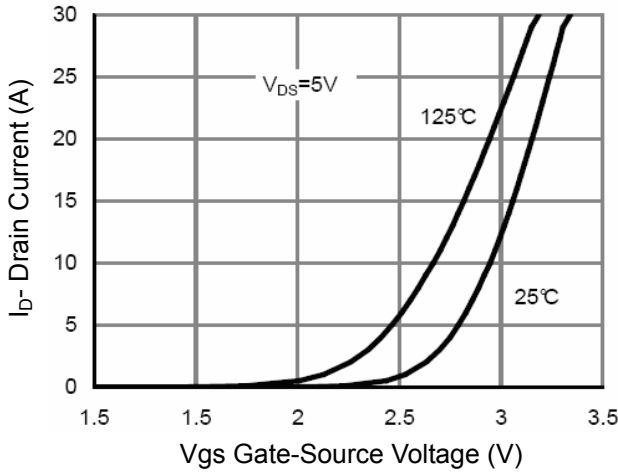


Figure 2 Transfer Characteristics

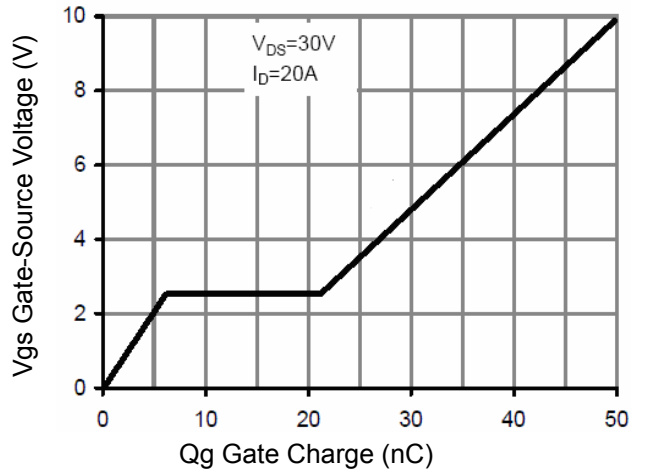


Figure 5 Gate Charge

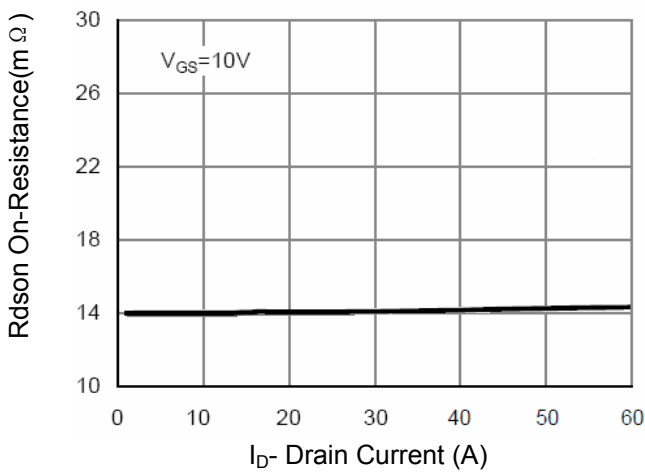


Figure 3 R_{dson} - Drain Current

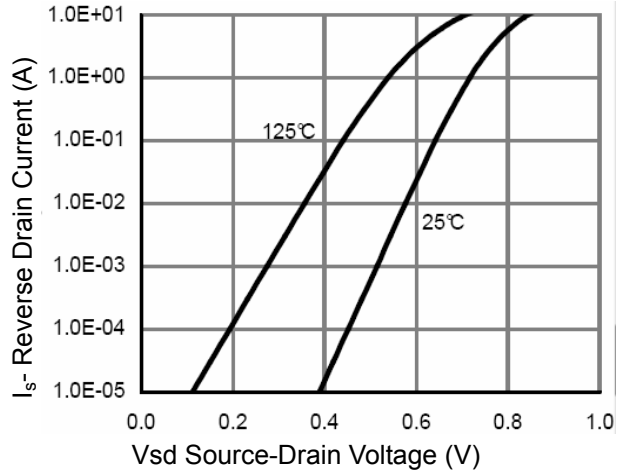


Figure 6 Source- Drain Diode Forward

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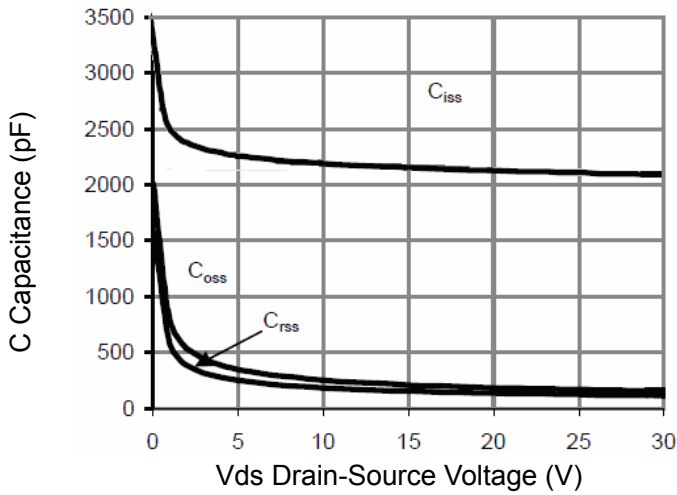


Figure 7 Capacitance vs Vds

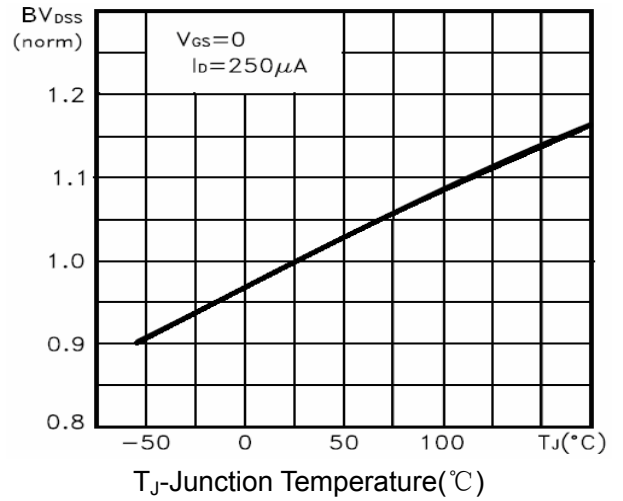


Figure 9 BV_{DSS} vs Junction Temperature

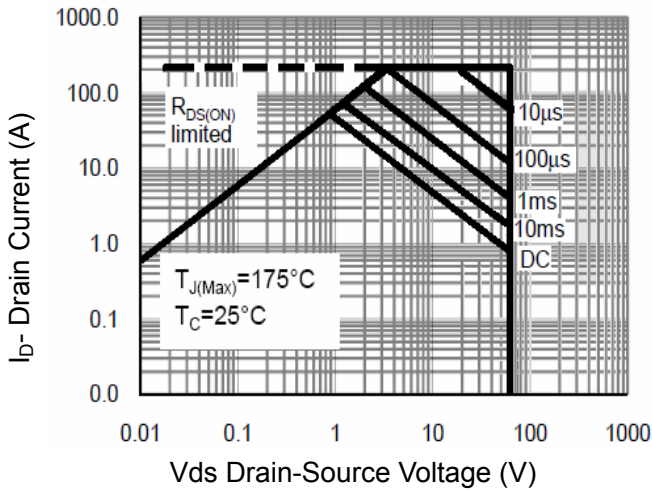


Figure 8 Safe Operation Area

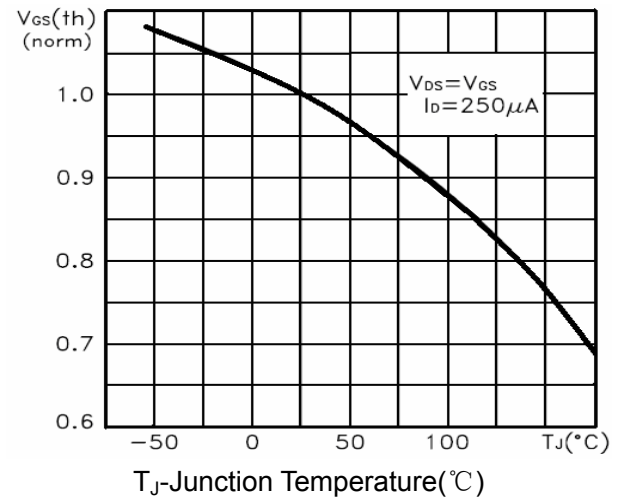


Figure 10 $V_{GS(th)}$ vs Junction Temperature

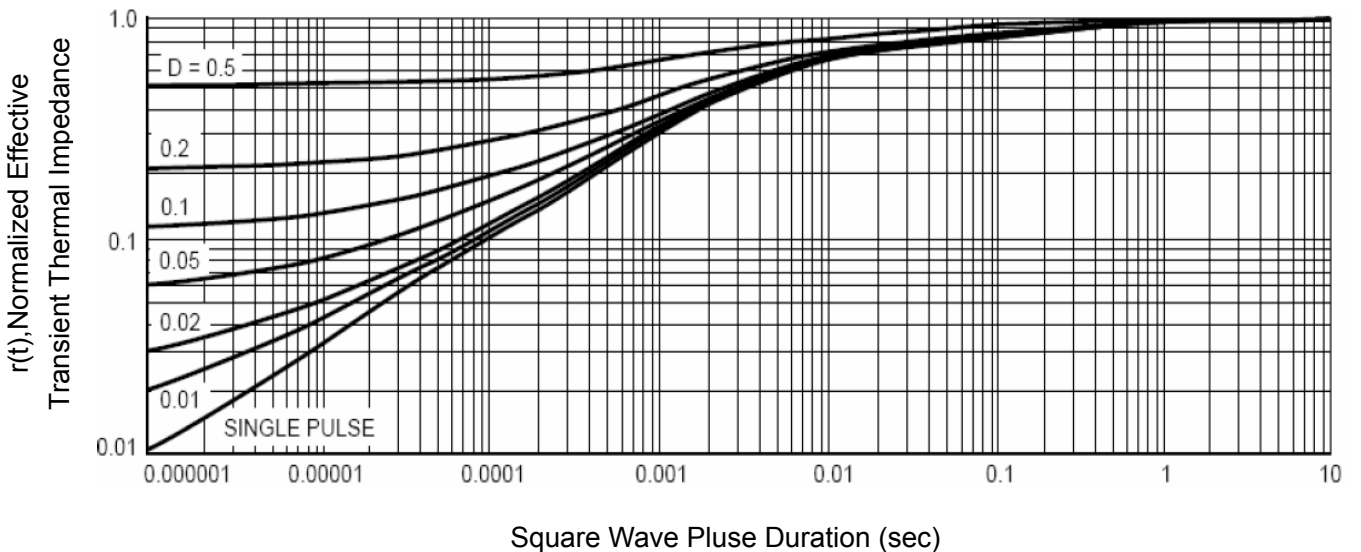


Figure 11 Normalized Maximum Transient Thermal Impedance