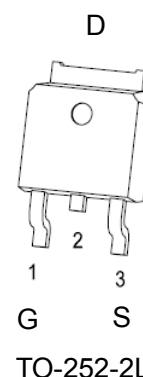


**Features**

- ◆ Low On-Resistance
- ◆ Fast Switching
- ◆ 100% Avalanche Tested
- ◆ Repetitive Avalanche Allowed up to T_{jmax}
- ◆ Lead-Free, RoHS Compliant

General Features

- ◆ $V_{DS} = 60V, I_D = 20A$
- $R_{DS(ON)} < 30m\Omega @ V_{GS} = 10V$
- $R_{DS(ON)} < 40m\Omega @ V_{GS} = 4.5V$

**Order Information**

Product	Package	Marking	Packing
PTD20N06	TO-252	PTD20N06	2500PCS/REF

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	20	A
Pulsed Drain Current (Note 2)	I_{DM}	60	A
Maximum Power Dissipation	P_D	40	W
Single pulse avalanche energy (Note 1)	E_{AS}	72	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C
Thermal Resistance, Junction-to-Case (Note 3)	$R_{\theta JC}$	3.7	°C/W



60V/20A 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 =250μA	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} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 4)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	2.0	3.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	24	30	mΩ
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =10A	-	30	40	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =4.5A	11	-	-	S
Dynamic Characteristics ^(Note5)						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V, F=1.0MHz	-	500	-	PF
Output Capacitance	C _{Oss}		-	60	-	PF
Reverse Transfer Capacitance	C _{rss}		-	25	-	PF
Switching Characteristics ^(Note 5)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A, R _L =6.7Ω V _{GS} =10V, R _G =3Ω	-	5	-	nS
Turn-on Rise Time	t _r		-	2.6	-	nS
Turn-Off Delay Time	t _{d(off)}		-	16.1	-	nS
Turn-Off Fall Time	t _f		-	2.3	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =4.5A, V _{GS} =10V	-	14		nC
Gate-Source Charge	Q _{gs}		-	2.9		nC
Gate-Drain Charge	Q _{gd}		-	5.2		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-		1.2	V
Diode Forward Current	I _S		-	-	20	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =20A di/dt = 100A/μs	-	35	-	nS
Reverse Recovery Charge	Q _{rr}		-	53	-	nC

Note:

- Limited by T_{Jmax} , starting $T_J = 25^{\circ}\text{C}$, $R_G = 25\Omega$, $V_D = 30V$, $V_{GS} = 10V$. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, $t \leq 10$ sec.
- Pulse Test: pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.



Typical Electrical and Thermal Characteristics (Curves)

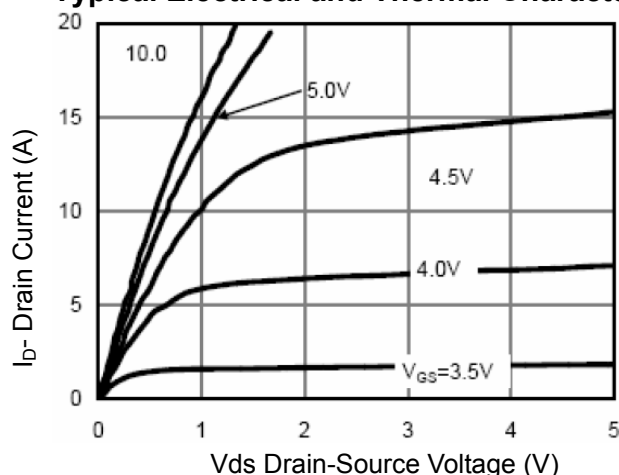


Figure 1 Output Characteristics

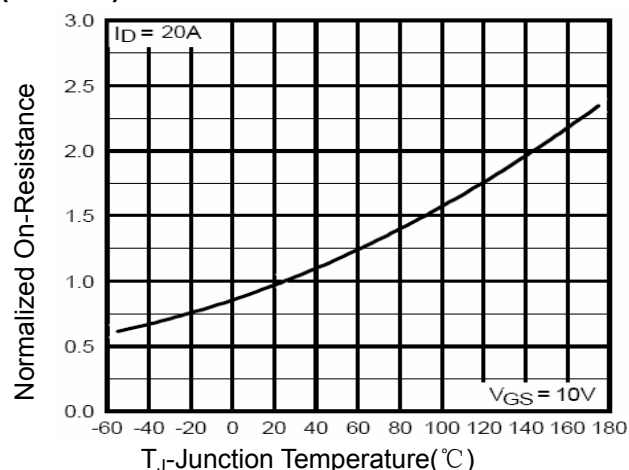


Figure 4 Rdson-Junction Temperature

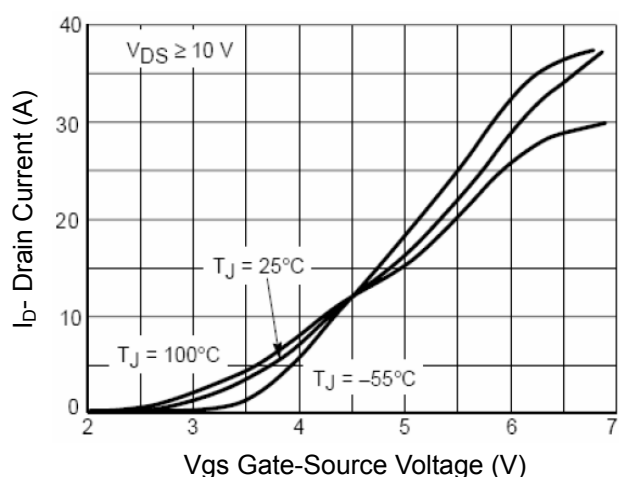


Figure 2 Transfer Characteristics

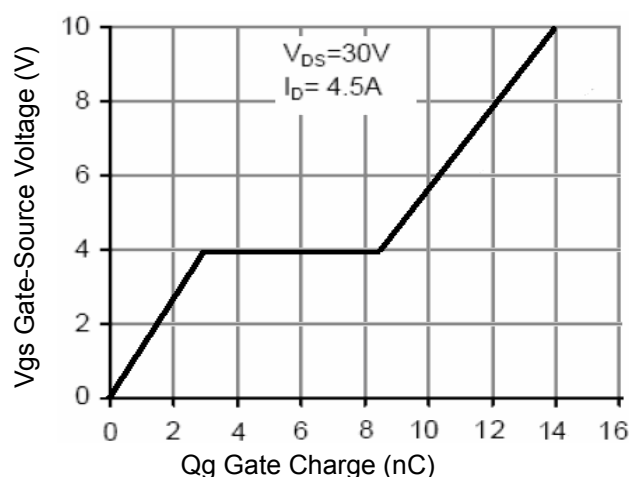


Figure 5 Gate Charge

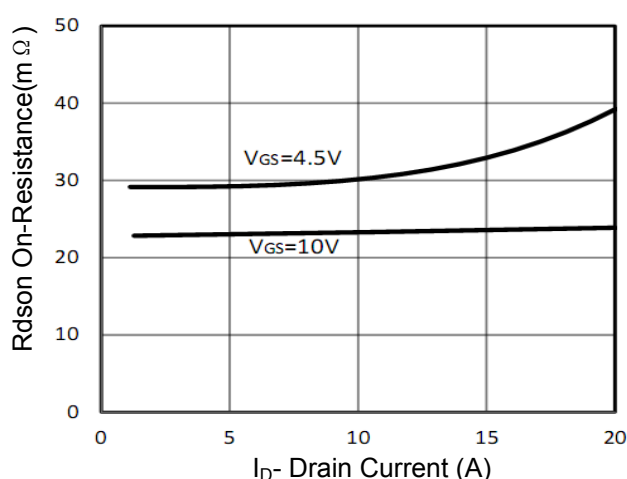


Figure 3 Rdson- Drain Current

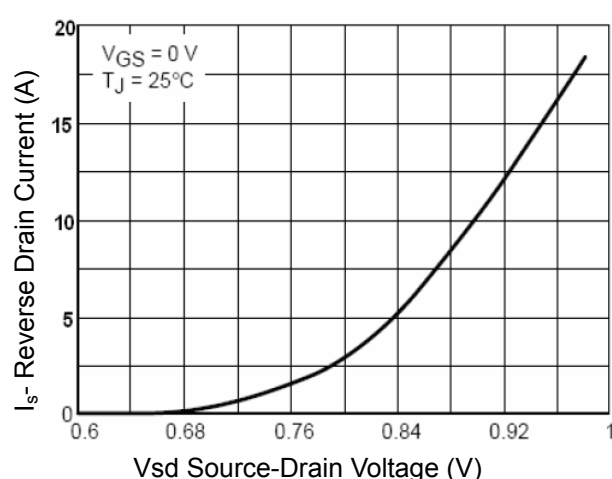


Figure 6 Source- Drain Diode Forward

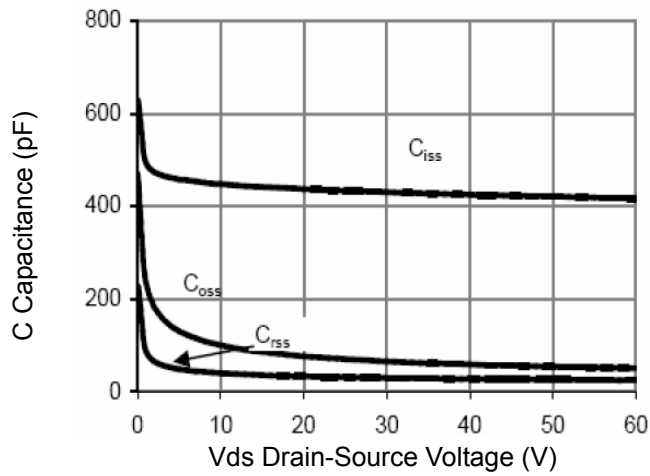


Figure 7 Capacitance vs Vds

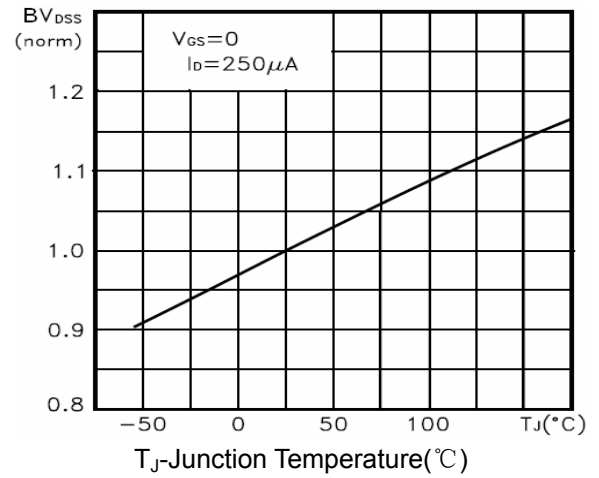


Figure 9 BV_{DSS} vs Junction Temperature

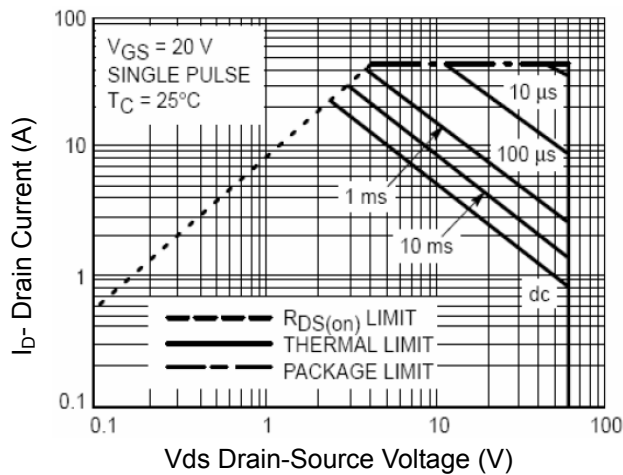


Figure 8 Safe Operation Area

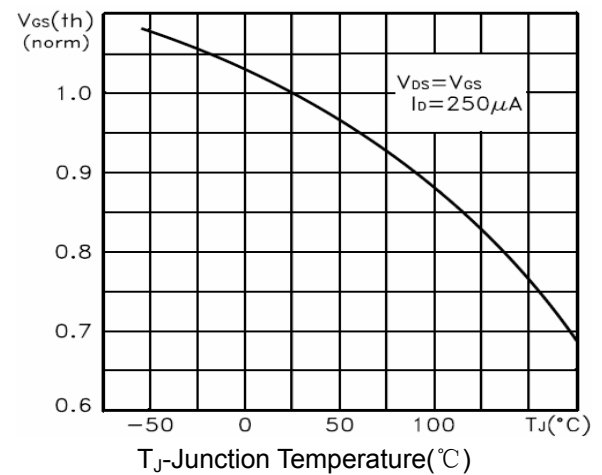


Figure 10 $V_{GS(th)}$ vs Junction Temperature

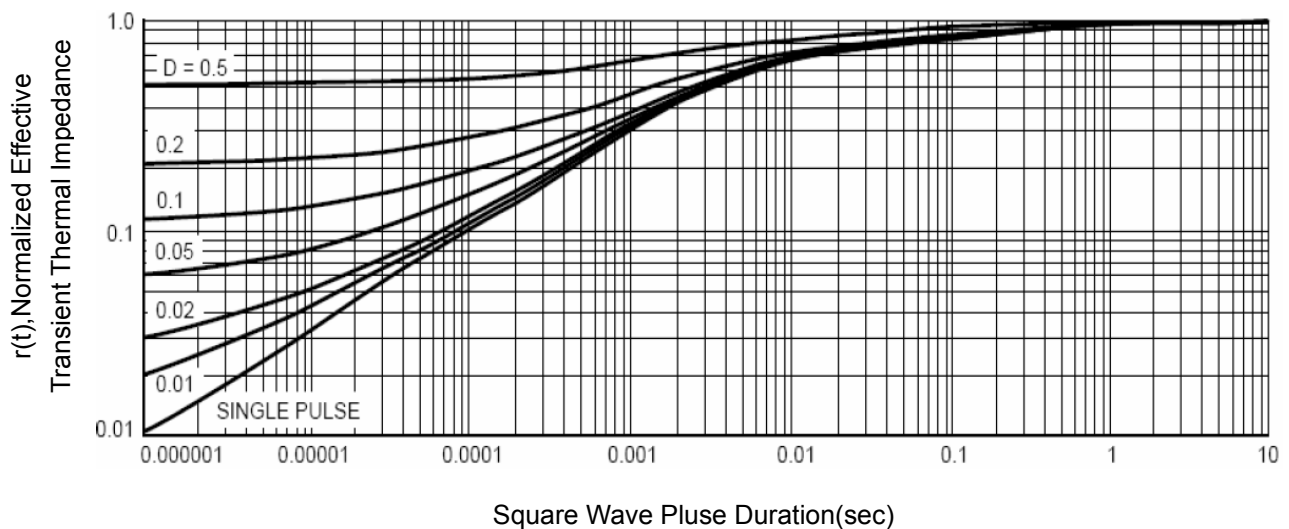
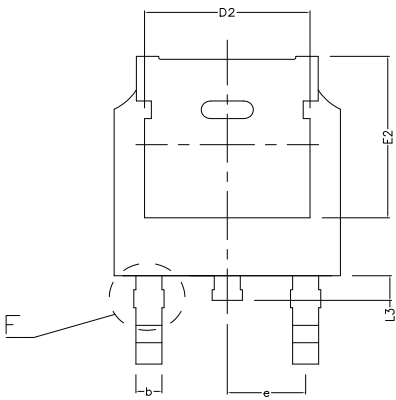


Figure 11 Normalized Maximum Transient Thermal Impedance

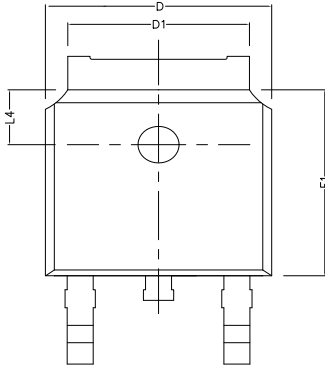


60V/20A N-Channel Advanced Power MOSFET

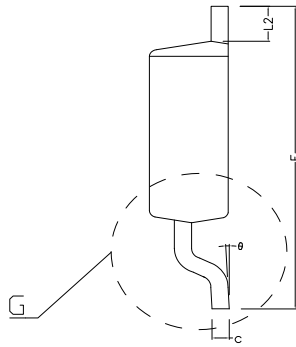
TO-252 Package Outline Dimensions



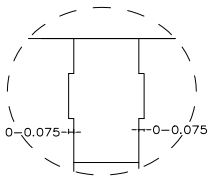
BOTTOM VIEW



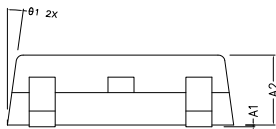
TOP VIEW



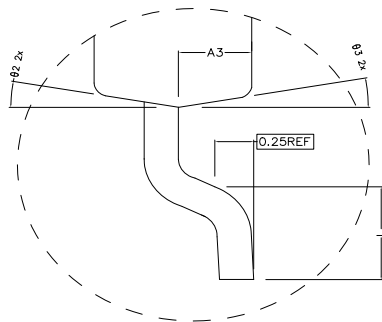
SIDE VIEW



DETAIL F



SIDE VIEW



DETAIL G

COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1	0.000	0.100	0.150
A2	2.200	2.300	2.400
A3	1.020	1.070	1.120
b	0.710	0.760	0.810
c	0.460	0.508	0.550
D	6.500	6.600	6.700
D1	5.330REF		
D2	4.830REF		
E	9.900	10.100	10.300
E1	6.000	6.100	6.200
E2	5.600REF		
e	2.286TYPE		
L	1.400	1.550	1.700
L2	1.10REF		
L3	0.80REF		
L4	1.80REF		
theta	0~8°		
theta1	7° TYPE		
theta2	10° TYPE		
theta3	10° TYPE		