



20V/60A N-Channel Enhancement Mode MOSFET

Description

The PTQ6002 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.

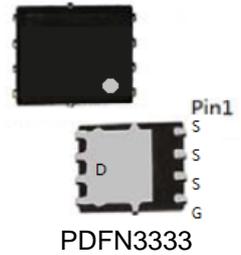
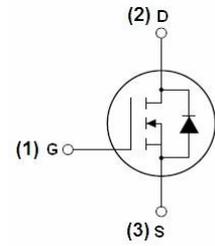
General Features

$V_{DS} = 20V$ $I_D = 60A$

$R_{DS(ON)} < 3.8m\Omega @ V_{GS}=4.5V$

Application

- Battery protection
- Load switch
- Uninterruptible power supply



Order Information

Product	Package	Marking	Packing
PTQ6002	PDFN3333	PTQ6002	5000PCS/Reel

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	60	A
Drain Current-Continuous($T_c=100^\circ C$)	$I_D(100^\circ C)$	42	A
Pulsed Drain Current	I_{DM}	210	A
Maximum Power Dissipation	P_D	32	W
Single pulse avalanche energy (Note 5)	E_{AS}	64	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$
Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	3.9	$^\circ C/W$



20V/60A N-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_c=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	20	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.5	-	1.0	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =20 A	-	3.2	3.8	mΩ
		V _{GS} =2.5V, I _D =15A		3.9	4.8	mΩ
Forward Transconductance	g _{FS}	V _{DS} =10V, I _D =20A	15	-	-	S
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, F=1.0MHz	-	2000	-	PF
Output Capacitance	C _{oss}		-	500	-	PF
Reverse Transfer Capacitance	C _{rss}		-	200	-	PF
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, I _D =2A, R _L =1Ω V _{GS} =4.5V, 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} =10V, I _D =20A, V _{GS} =10V	-	27		nC
Gate-Source Charge	Q _{gs}		-	6.5		nC
Gate-Drain Charge	Q _{gd}		-	6.4		nC
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =10A	-		1.2	V
Diode Forward Current ^(Note 2)	I _S		-	-	60	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 20A di/dt = 100A/μs ^(Note3)	-	25	-	nS
Reverse Recovery Charge	Q _{rr}		-	24	-	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 ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : T_J=25°C V_{DD}=10V, V_G=10V, L=0.5mH, I_{AS}=16A



20V/60A N-Channel Enhancement Mode MOSFET

Typical Electrical and Thermal Characteristics (Curves)

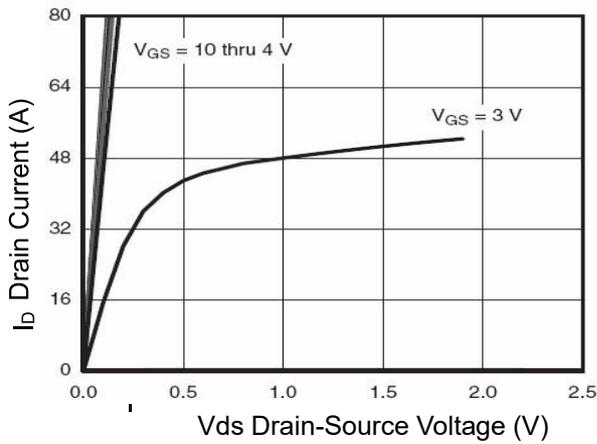


Figure 1 Output Characteristics

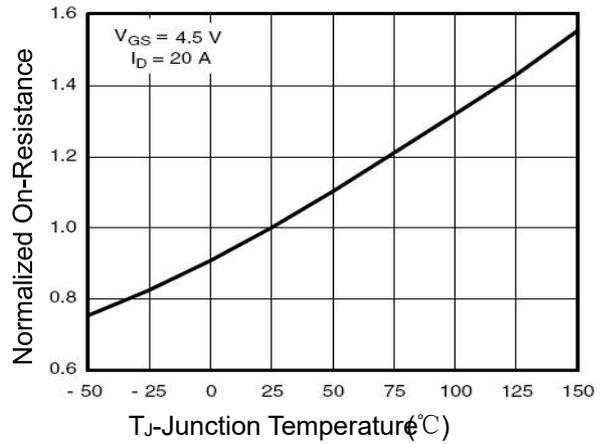


Figure 4 Rds(on)-Junction Temperature

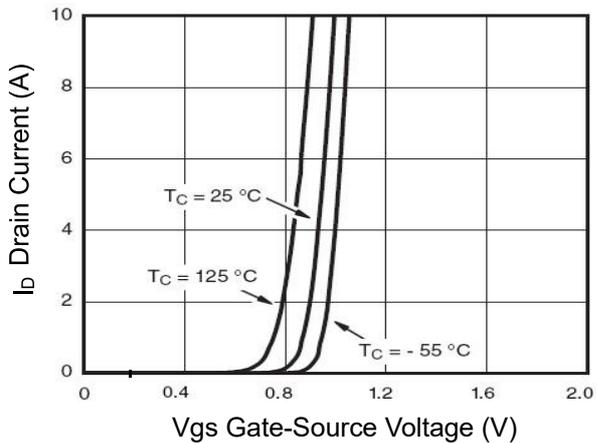


Figure 2 Transfer Characteristics

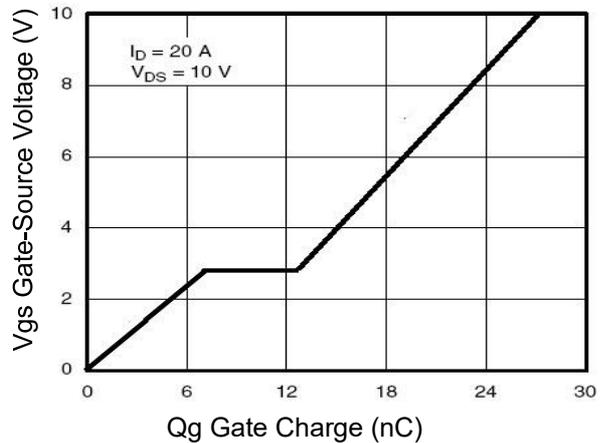


Figure 5 Gate Charge

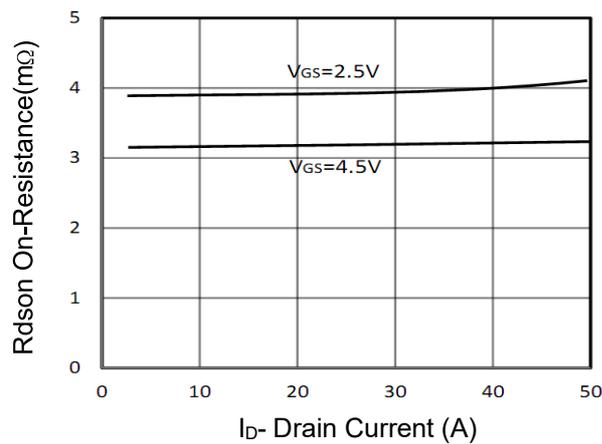


Figure 3 Rds(on)- Drain Current

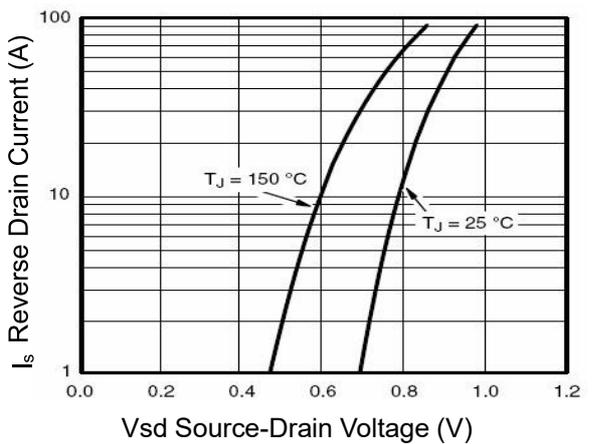


Figure 6 Source- Drain Diode Forward



20V/60A N-Channel Enhancement Mode MOSFET

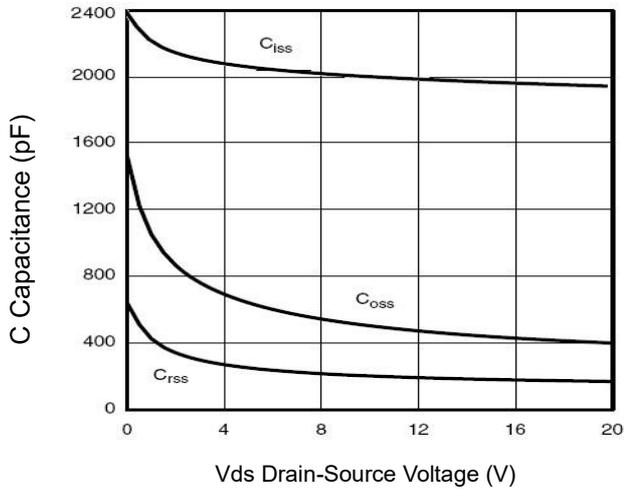


Figure 7 Capacitance vs Vds

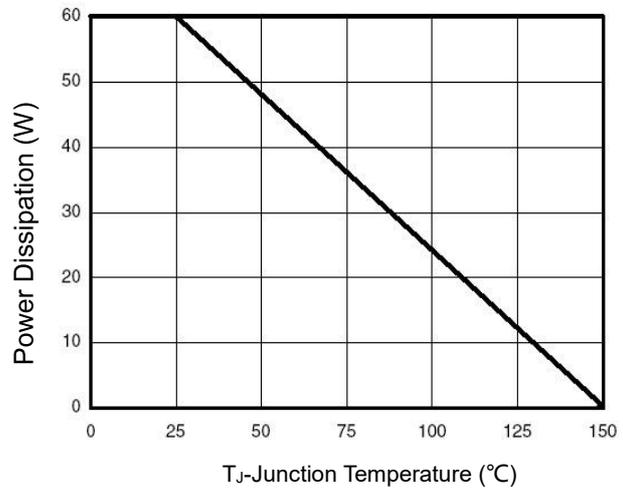


Figure 9 Power De-rating

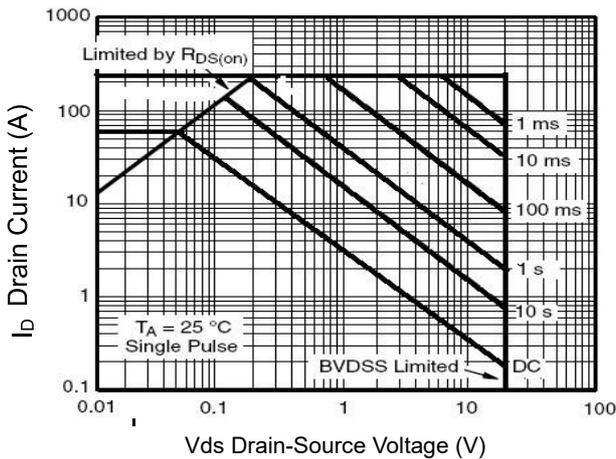


Figure 8 Safe Operation Area

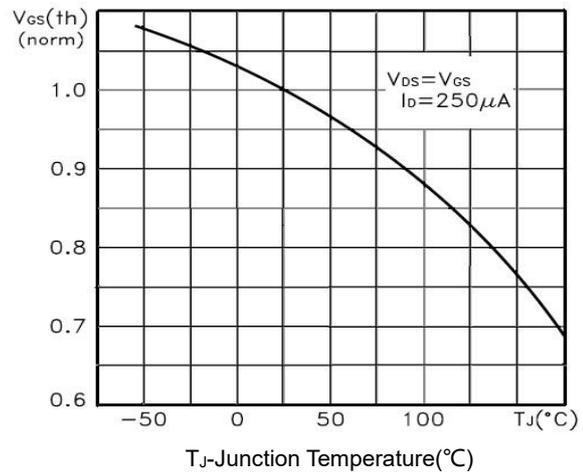


Figure 10 VGS(th) vs Junction Temperature

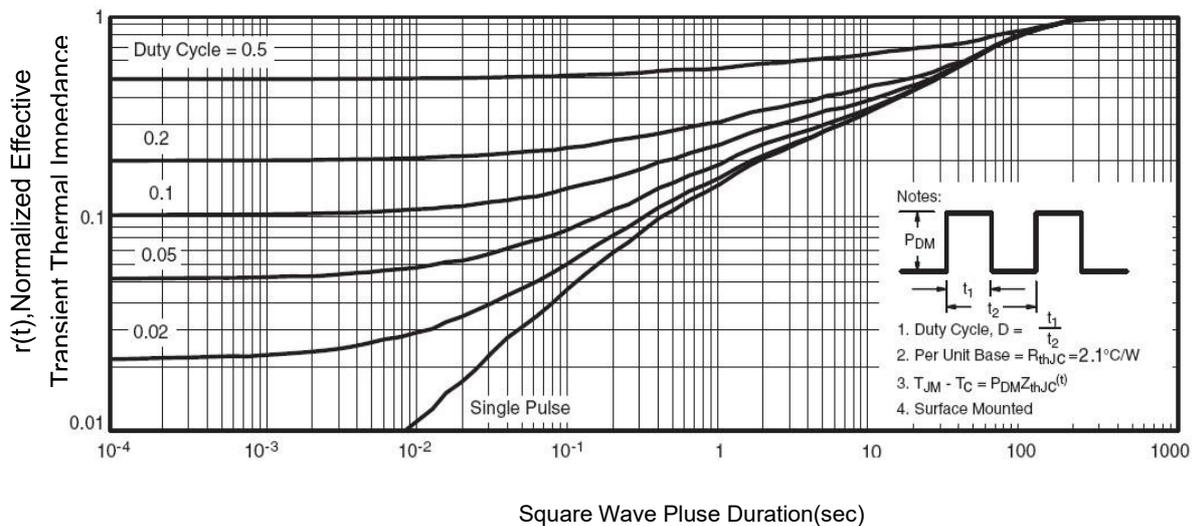
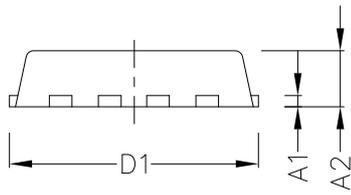


Figure 11 Normalized Maximum Transient Thermal Impedance

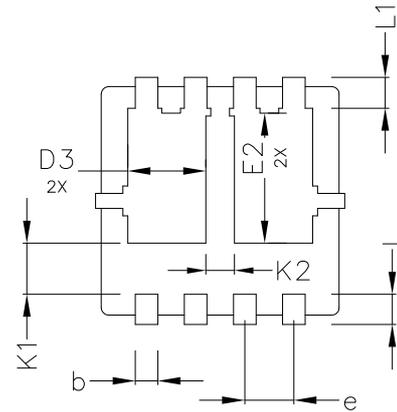


20V/60A N-Channel Enhancement Mode MOSFET

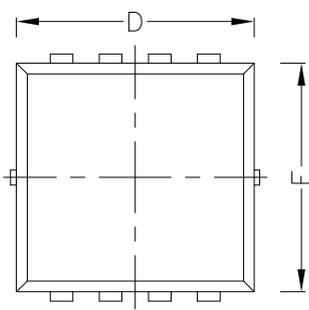
PDFN3333 Package Outline Dimensions (Units: mm)



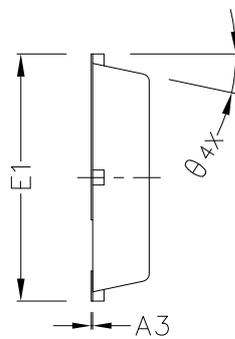
SIDE VIEW



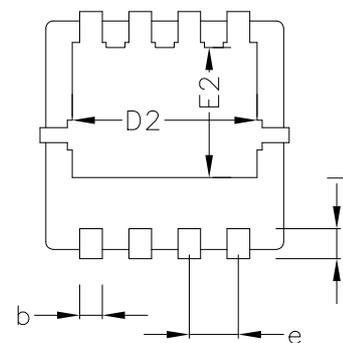
BOTTOM VIEW
OPTION 2



TOP VIEW



SIDE VIEW



BOTTOM VIEW
OPTION 1

COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1	0.152 BSC		
A2	0.650	0.750	0.850
A3	0.005	—	0.020
b	0.250	0.300	0.350
D	3.050	3.150	3.250
D1	3.200	3.300	3.400
D2	2.350	2.450	2.550
D3	0.935	1.035	1.135
E1	3.150	3.300	3.450
E	2.950	3.050	3.150
E2	1.635	1.735	1.835
e	0.650 TYPE		
L	0.300	0.400	0.500
θ	12° TYPE		
K1	0.680 REF		
K2	0.380 REF		
L1	0.410 REF		