

40V/40A N-Channel Advanced Power MOSFET

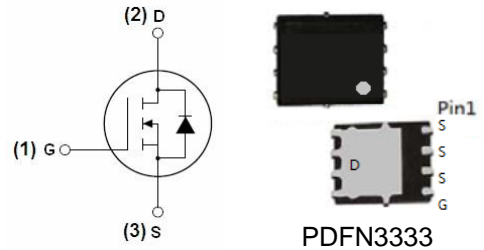
Features

- Low $R_{DS(on)}$
- 5V Logic Level Control

Applications

- Load Switch
- Battery Switch
- Optimized for Power Management Applications for Portable Products, such as Aeromodelling, Power bank, Brushless motor, Main board , and Others

BVDSS	40	V
ID	40	A
$R_{DS(on)}@V_{GS}=10V$	6.0	mΩ
$R_{DS(on)}@V_{GS}=4.5V$	8.5	mΩ



Order Information

Product	Package	Marking	Packing
MSQ4040	PDFN3333	PTQ4040	5000PCS/Reel

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
--------	-----------	--------	------

Common Ratings ($T_c=25^\circ\text{C}$ Unless Otherwise Noted)

V_{GS}	Gate-Source Voltage	± 20	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	40	V	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_c=25^\circ\text{C}$	40	A

Mounted on Large Heat Sink

I_{DM}	Pulse Drain Current Tested (Silicon Limit)	$T_c=25^\circ\text{C}$	160	A
I_D	Continuous Drain current @ $V_{GS}=10V$ (Note 2)	$T_c=25^\circ\text{C}$	40	A
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	33	W
EAS	Avalanche Energy, Single Pulsed (Note 3)		72	mJ
$R_{\theta JC}$	Thermal Resistance Junction-to-Case ≤ 5 s (Note 1)		3.78	$^\circ\text{C/W}$

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain current	VDS=40V,VGS=0V	--	--	1	μA
I _{GSS}	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	VDS=VGS,ID=250μA	1	--	2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance (Note3)	VGS=10V,ID=20A	--	5.3	6.0	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance (Note3)	VGS=4.5V,ID=20A	--	6.9	8.5	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	VDS=20V,VGS=0V, f=1MHz	--	2400	--	pF
C _{oss}	Output Capacitance		--	192	--	pF
C _{rss}	Reverse Transfer Capacitance		--	165	--	pF
Q _g	Total Gate Charge	VDS=20V,ID=20A VGS=10V	--	46	--	nC
Q _{gs}	Gate-Source Charge		--	7.2	--	nC
Q _{gd}	Gate-Drain Charge		--	8.8	--	nC
Switching Characteristics ^{note B}						
t _{d(on)}	Turn-on Delay Time	VDD=20V ID=20A, RGEN=3Ω, RL=1Ω, VGS=10V	--	8	--	nS
t _r	Turn-on Rise Time		--	16	--	nS
t _{d(off)}	Turn-Off Delay Time		--	21	--	nS
t _f	Turn-Off Fall Time		--	10	--	nS
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	IS=20A,VGS=0V	--	--	1.2	V

Note :

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J=25°C , VD=20V, RG=25Ω , VGS=10V
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical characteristic curve:

Figure 1: Output Characteristics

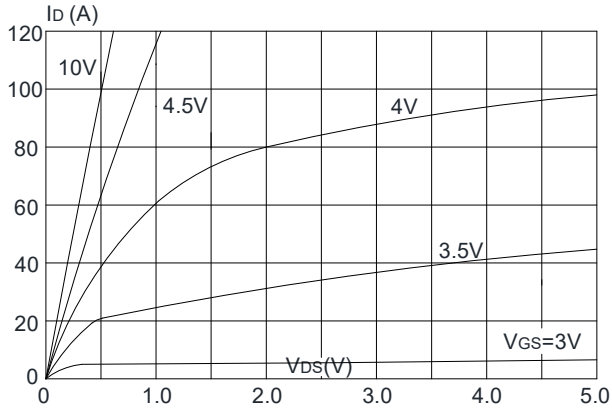


Figure 2: Typical Transfer Characteristics

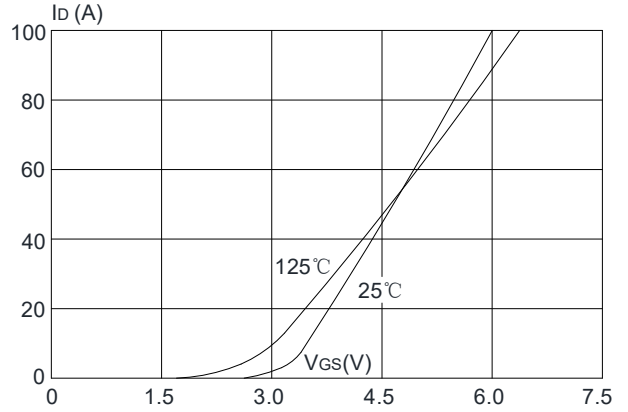


Figure 3: On-resistance vs. Drain Current

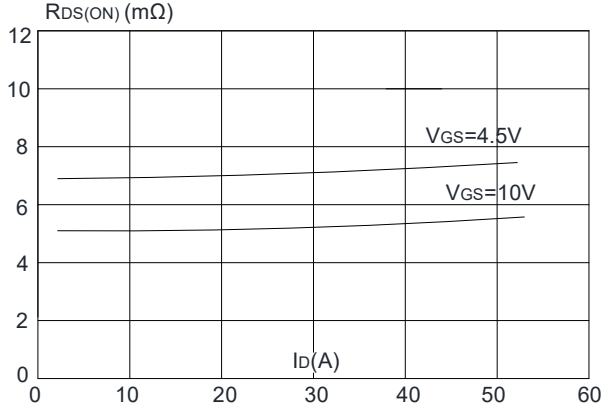


Figure 4: Body Diode Characteristics

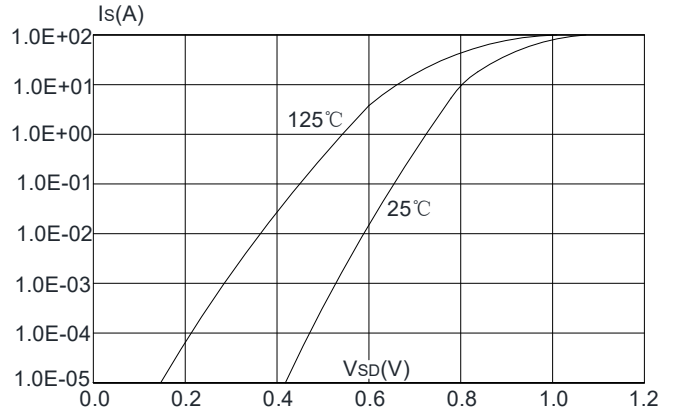


Figure 5: Gate Charge Characteristics

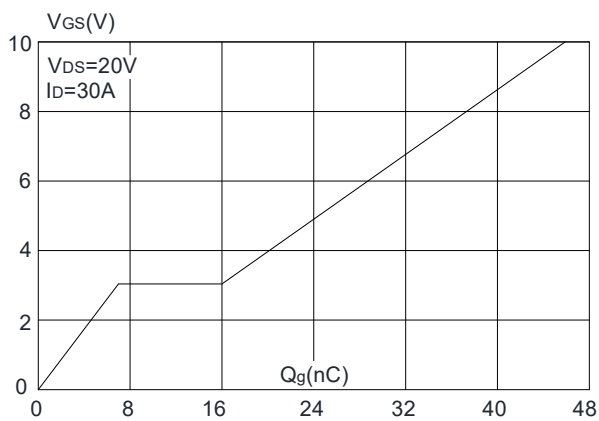
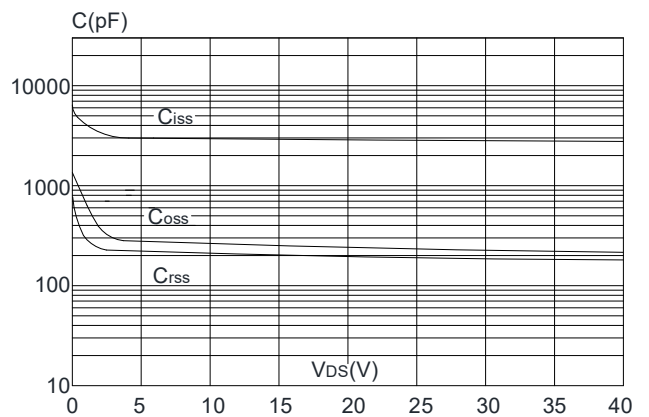


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

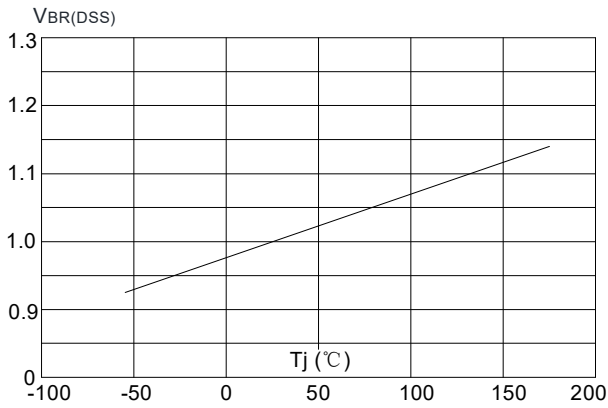


Figure 8: Normalized on Resistance vs. Junction Temperature

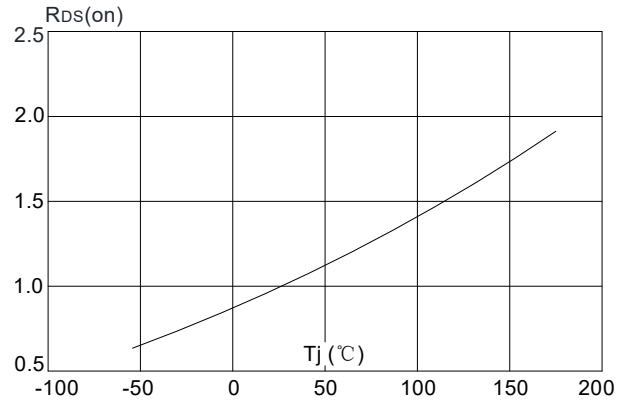


Figure 9: Maximum Safe Operating Area

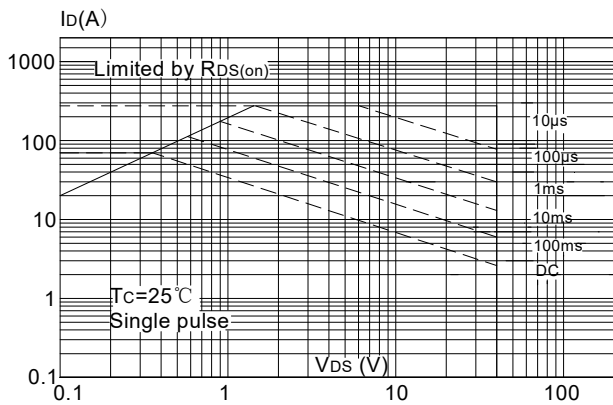


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

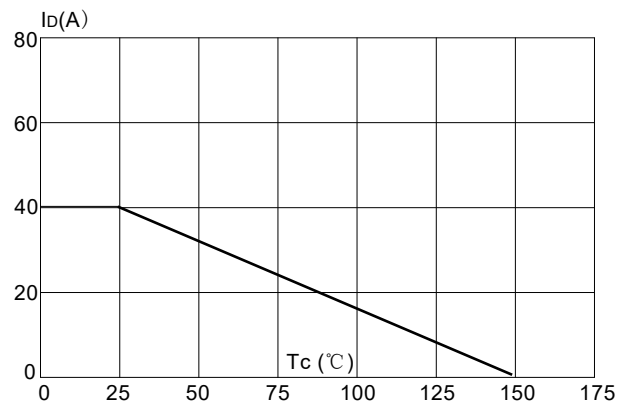


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

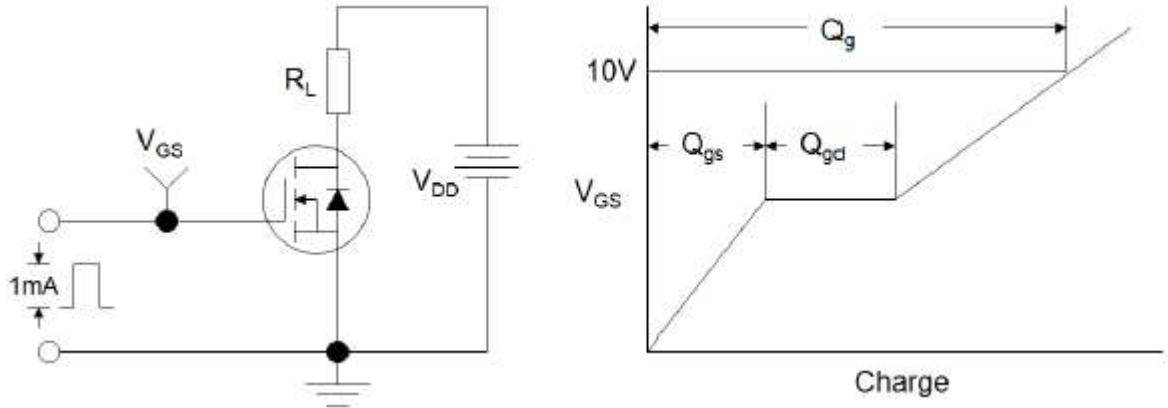


Figure1:Gate Charge Test Circuit & Waveform

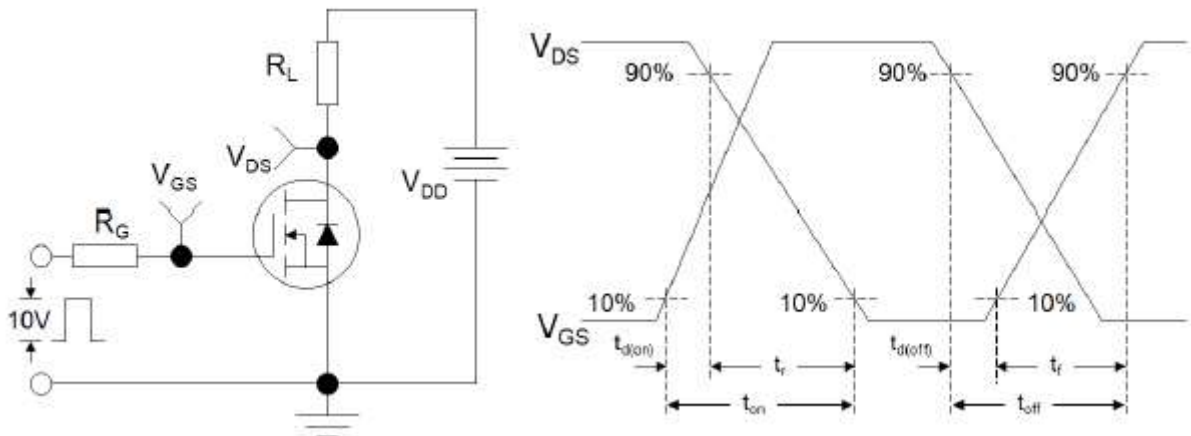


Figure 2: Resistive Switching Test Circuit & Waveforms

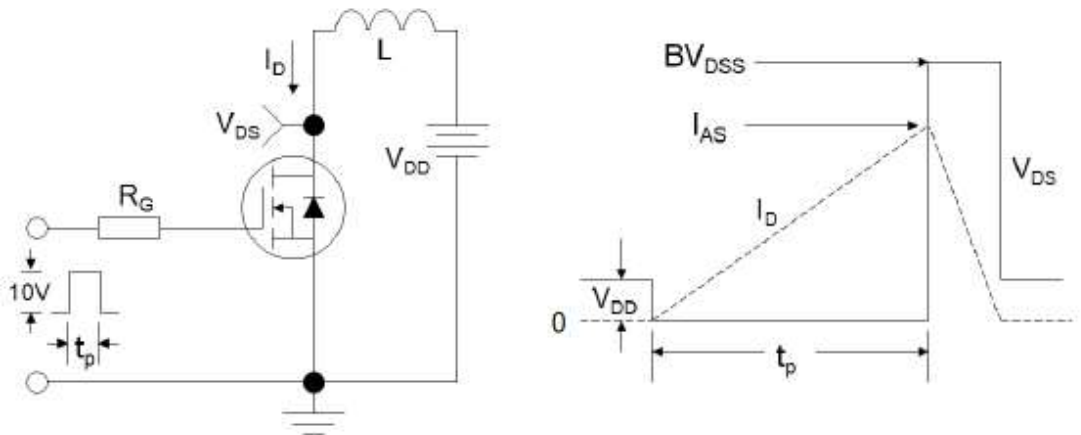
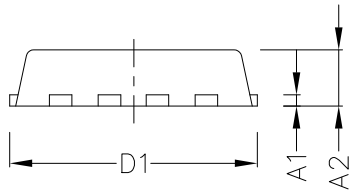
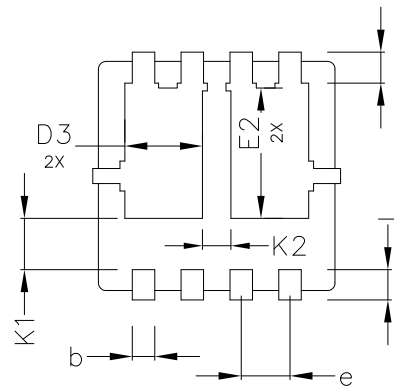


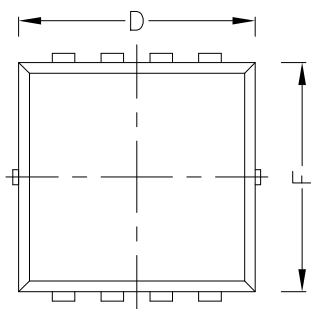
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



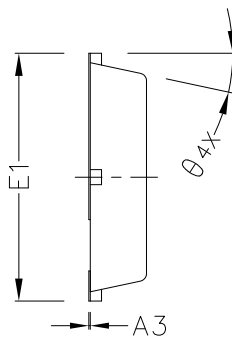
SIDE VIEW



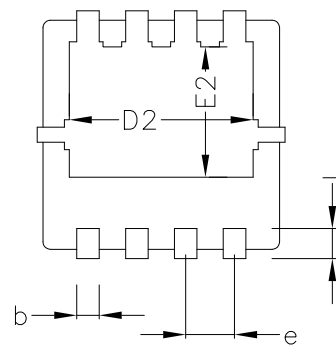
BOTTOM VIEW
OPTION 2



TOP VIEW



SIDE VIEW



BOTTOM VIEW
OPTION 1

	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		