

**FEATURES**

- $BV_{DSS}=100V$ ,  $I_D=160A$
- $R_{DS(on)}:3.3m\Omega$  (Max) @  $V_{GS}=10V$
- Very low FOM  $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- RoHS compliant


**APPLICATIONS**

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- High-Frequency Switching and Synchronous Rectification



Device Marking and Package Information		
Device	Package	Marking
MPGP10R033	TO-220	MPGP10R033

Absolute Maximum Ratings $T_C = 25^\circ C$ , unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DSS}$	100	V
Continuous Drain Current	$I_D$	160	A
Pulsed Drain Current (note1)	$I_{DM}$	640	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	240	mJ
Power Dissipation ( $T_C = 25^\circ C$ )	$P_D$	245	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+175	$^\circ C$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case Max	$R_{thJC}$	0.61	K/W
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	60	



Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 100V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 80A$	--	3.0	3.3	m $\Omega$
Gate Resistance	$R_G$	$f = 1.0\text{MHz}$ , open drain	--	1.9	--	$\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = 50V,$ $f = 1.0\text{MHz}$	--	4950	--	pF
Output Capacitance	$C_{oss}$		--	1692	--	
Reverse Transfer Capacitance	$C_{rss}$		--	43	--	
Total Gate Charge	$Q_g$	$V_{DD} = 50V, I_D = 80A,$ $V_{GS} = 10V$	--	120	--	nC
Gate-Source Charge	$Q_{gs}$		--	31.8	--	
Gate-Drain Charge	$Q_{gd}$		--	24	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 50V, I_D = 80A,$ $V_{GS} = 10V, R_G = 2.4\Omega$	--	94	--	ns
Turn-on Rise Time	$t_r$		--	142	--	
Turn-off Delay Time	$t_{d(off)}$		--	306	--	
Turn-off Fall Time	$t_f$		--	120	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	160	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	480	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 80A, V_{GS} = 0V$	--	0.82	1.2	V
Reverse Recovery Time	$t_{rr}$	$V_R = 100V, I_F = 80A,$ $di_F/dt = 100A/\mu s$	--	78	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	12	--	nC
Peak Reverse Recovery Current	$I_{rrm}$		--	3	--	A

### Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L=0.5\text{mH}, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

## Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics

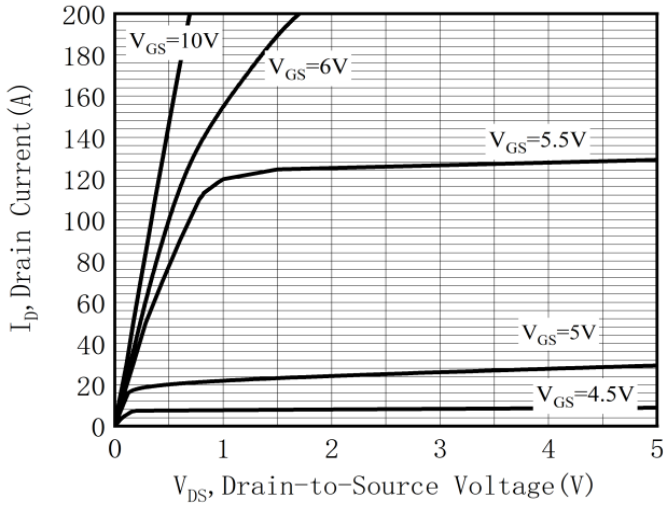


Figure 2. Transfer Characteristics

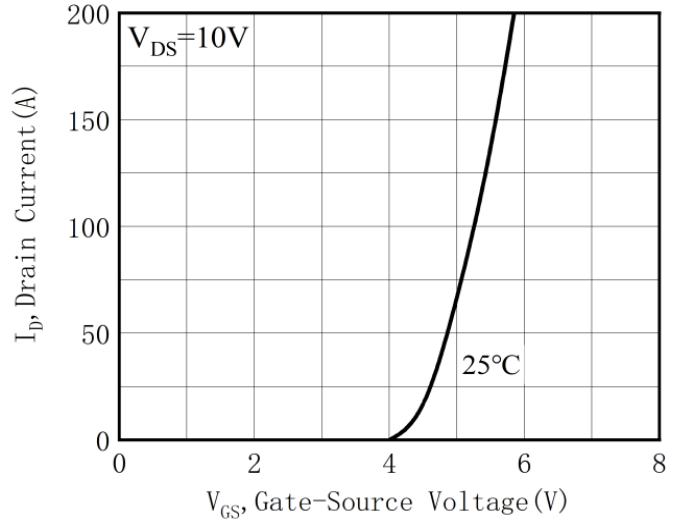


Figure 3. On-Resistance vs Drain Current

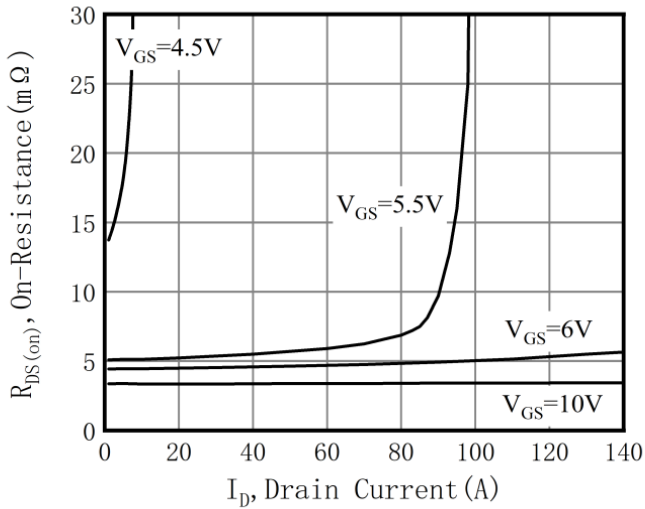


Figure 4. Capacitance

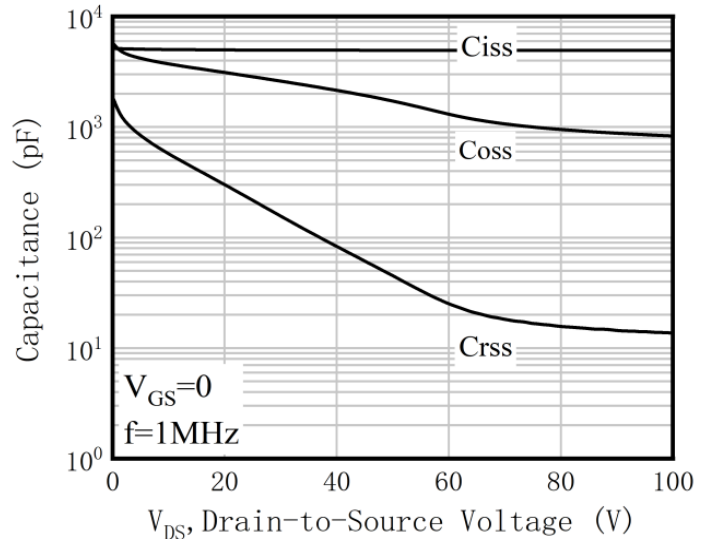


Figure 5. Gate Charge

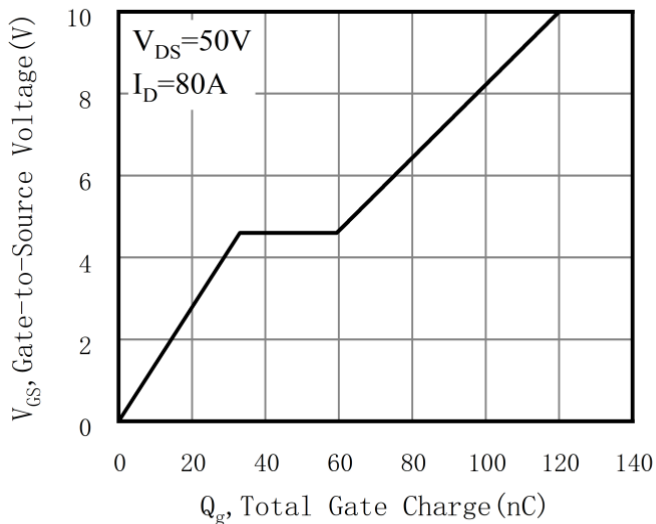
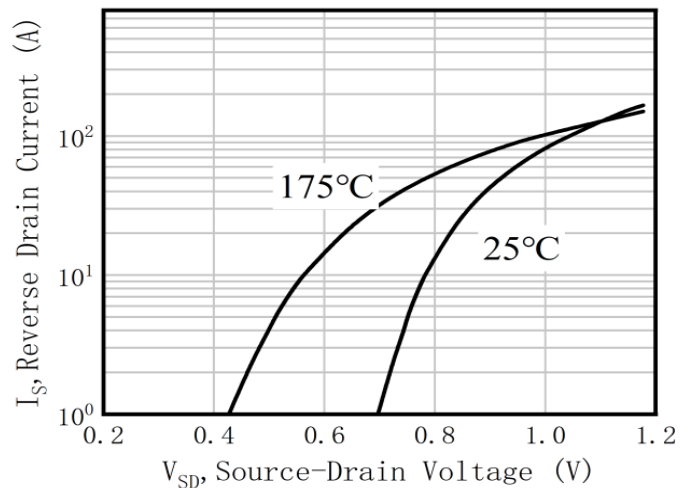


Figure 6. Body Diode Forward



## Typical Characteristics $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. On-Resistance vs Junction Temperature

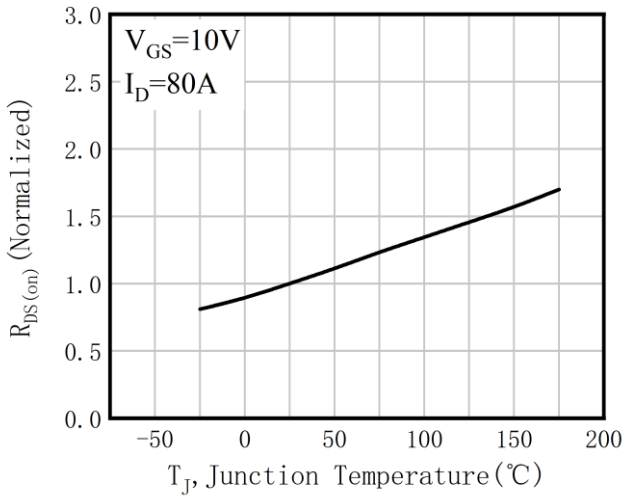


Figure 8. Threshold Voltage vs Junction Temperature

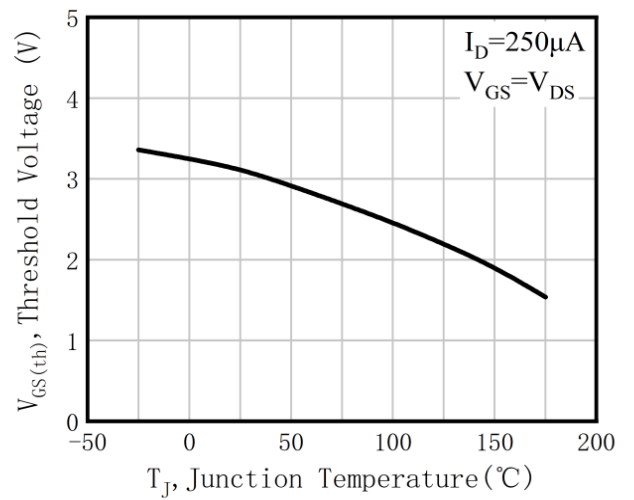


Figure 9. Transient thermal Impedance

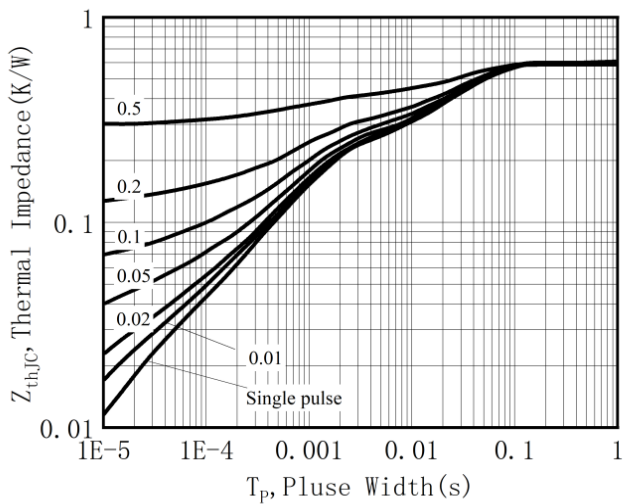


Figure 10. Safe Operating Area

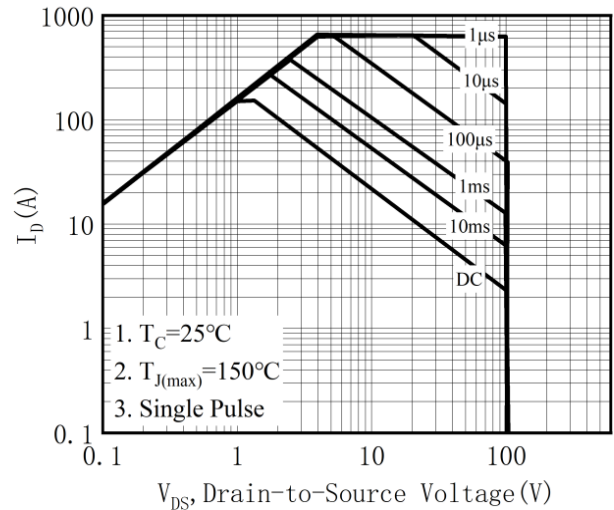


Figure A: Gate Charge Test Circuit and Waveform

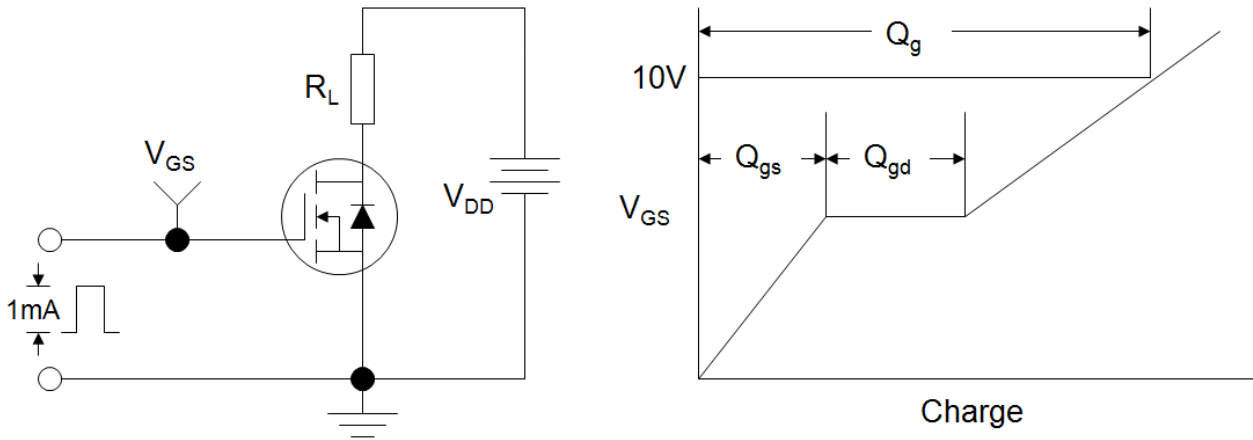


Figure B: Resistive Switching Test Circuit and Waveform

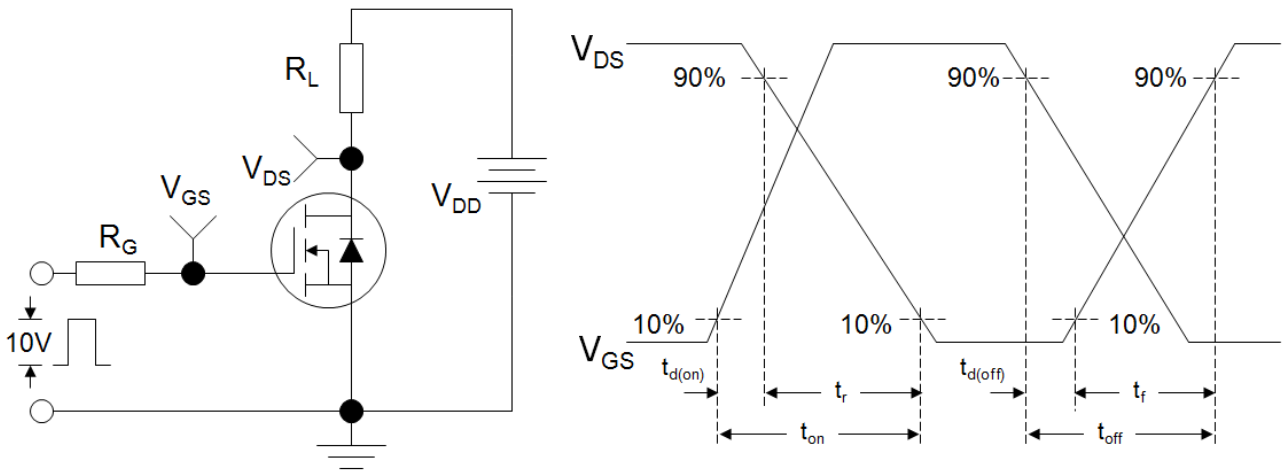
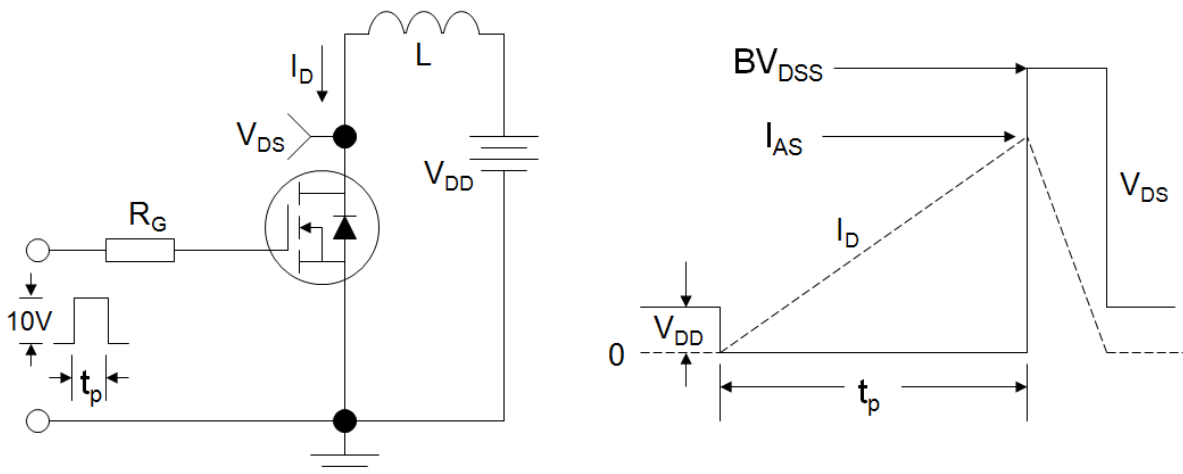
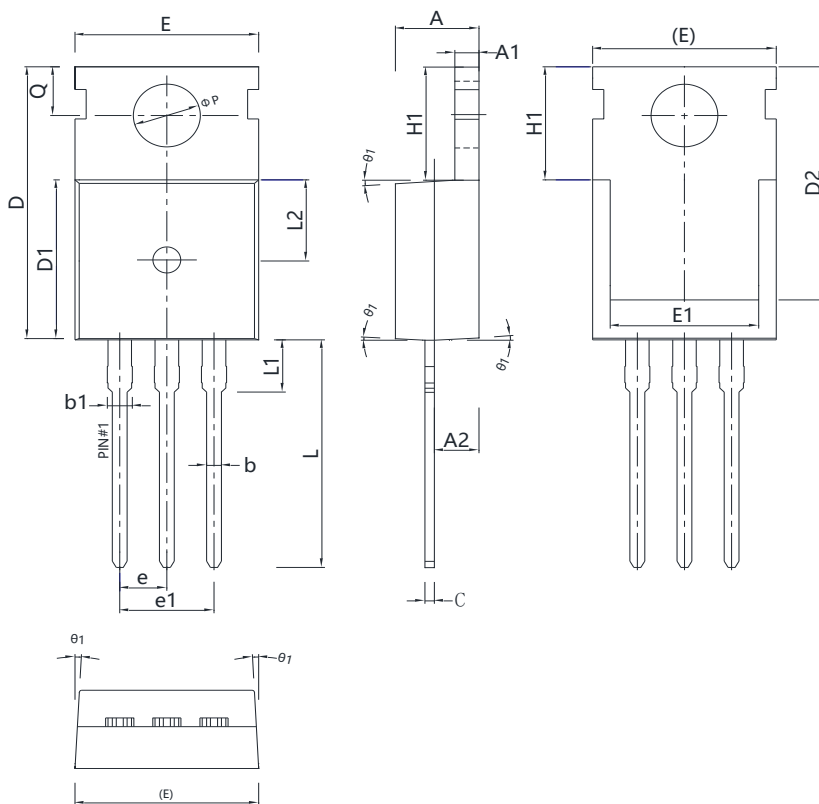


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO-220



Symbol	mm		
	Min	Nom	Max
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	-	0.90
b1	1.27	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54 BSC		
e1	5.08 BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.60 REF		
ΦP	3.55	3.60	3.65
Q	2.73	-	2.87
θ1	1°	3°	5°