
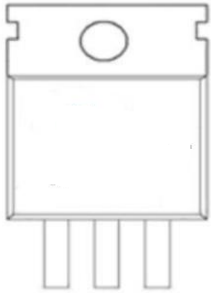


**TMG60N10P**

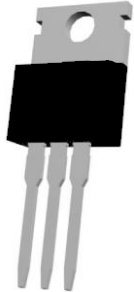
**N-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = 100V</math> <math>I_D = 60A</math>  <math>R_{DS(ON)} = 13.8m\Omega</math>(typ.) @ <math>V_{GS} = 10V</math></p> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> 
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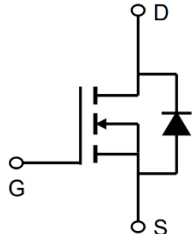


Marking: 60N10

P:TO-220AB



G D S



**Absolute Maximum Ratings:** ( $T_C = 25^\circ C$  unless otherwise noted)

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>1)</sup> , $T_C = 25^\circ C$	60	A
$I_{D, pulse}$	Pulsed drain current <sup>2)</sup> , $T_C = 25^\circ C$	98	A
$P_D$	Power dissipation <sup>3)</sup> , $T_C = 25^\circ C$	96	W
$E_{AS}$	Single pulsed avalanche energy <sup>5)</sup>	65	mJ
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

**Thermal Characteristics:**

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.3	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>4)</sup>	62	

# TMG60N10P

# N-Channel Enhancement Mosfet

Electrical Characteristics: ( $T_c=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	100	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=100V$	---	---	1	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1.4	---	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=10A$	---	13.8	20	m $\Omega$
		$V_{GS}=4.5V, I_D=7A$	---	17.4	26	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=50V, V_{GS}=0V,$ $f=100\text{KHz}$	---	1000	---	pF
$C_{oss}$	Output Capacitance		---	180	---	
$C_{rss}$	Reverse Transfer Capacitance		---	9.5	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=50V, I_D=5A,$ $V_{GS}=10V, R_G=10\Omega$	---	16.6	--	ns
$t_r$	Rise Time		---	3.8	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	75.5	---	ns
$t_f$	Fall Time		---	46	---	ns
$Q_g$	Total Gate Charge	$V_{GS}=10V, V_{DS}=50V,$ $I_D=5A$	---	16.2	---	nC
$Q_{gs}$	Gate-Source Charge		---	2.8	---	nC
$Q_{gd}$	Gate-Drain Charge		---	4.1	---	nC
$V_{plateau}$	Gate plateau voltage		---	3	---	V
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=12A$	---	---	1.3	V
$t_{rr}$	Reverse Recovery Time	$V_R=50\text{V}, I_S=5\text{A},$ $di/dt=100\text{A}/\mu\text{s}$	---	49	---	Ns
$q_{rr}$	Reverse Recovery Charge		---	61.8	---	nc
$I_{rmm}$	Peak reverse recovery current		---	2.4	---	A

**Notes:**

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25^\circ\text{C}$ .
- 5)  $V_{DD}=50\text{V}, V_{GS}=10\text{V}, L=0.3\text{mH}$ , starting  $T_j=25^\circ\text{C}$ .

Typical Characteristics: ( $T_C=25^\circ\text{C}$  unless otherwise noted)

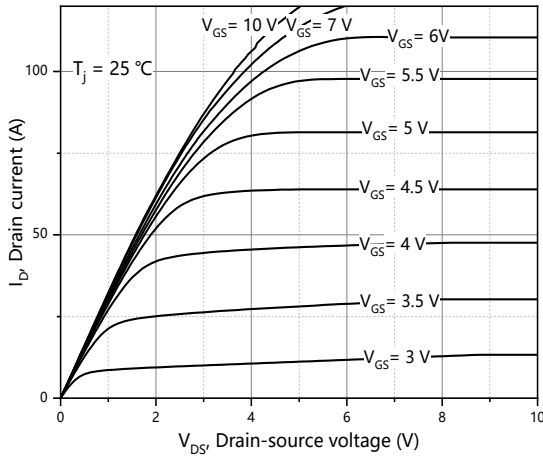


Figure 1. Typ. output characteristics

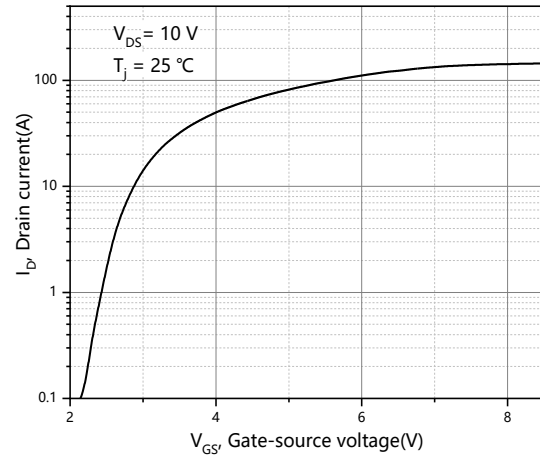


Figure 2. Typ. transfer characteristics

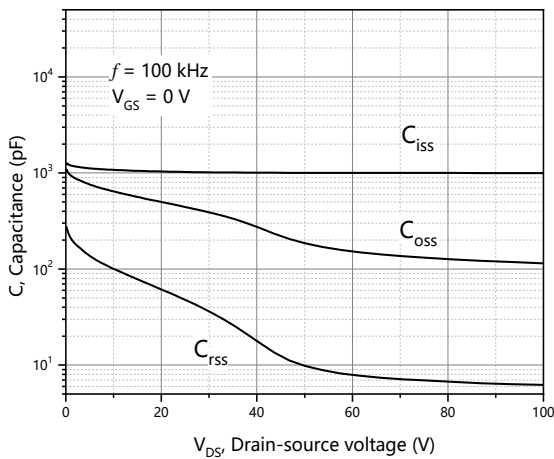


Figure 3. Typ. capacitances

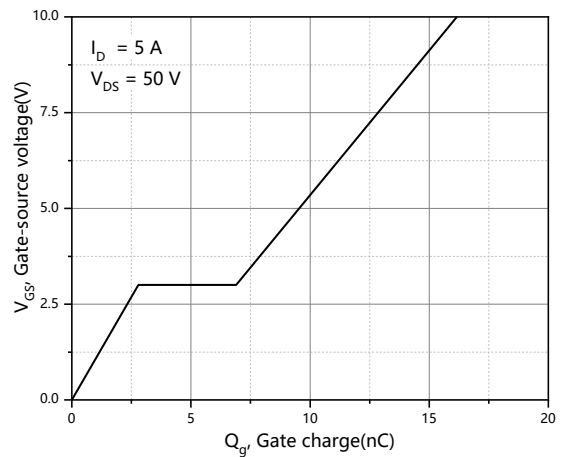


Figure 4. Typ. gate charge

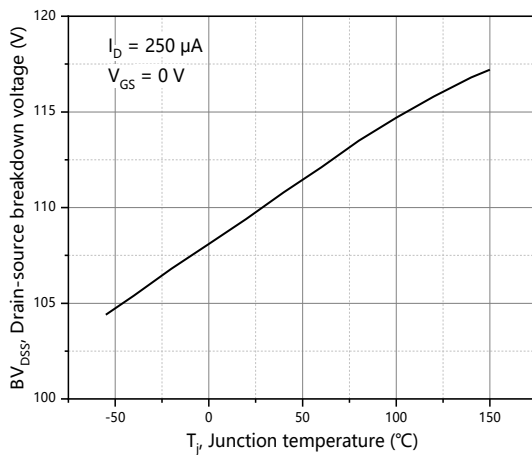


Figure 5. Drain-source breakdown voltage

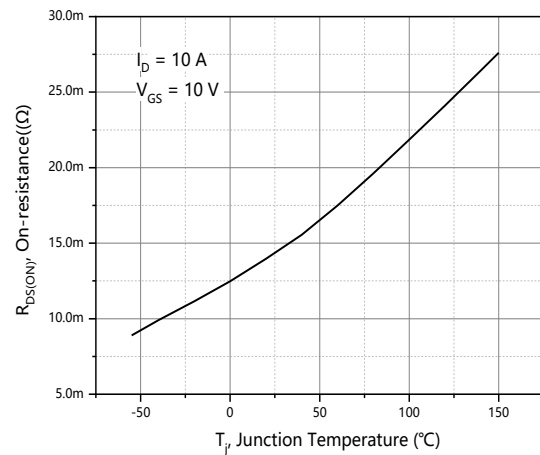


Figure 6. Drain-source on-state resistance



# TMG60N10P

## N-Channel Enhancement Mosfet

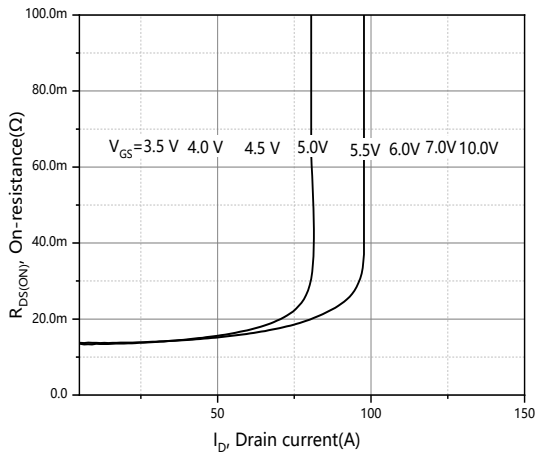


Figure 7. Drain-source on-state resistance

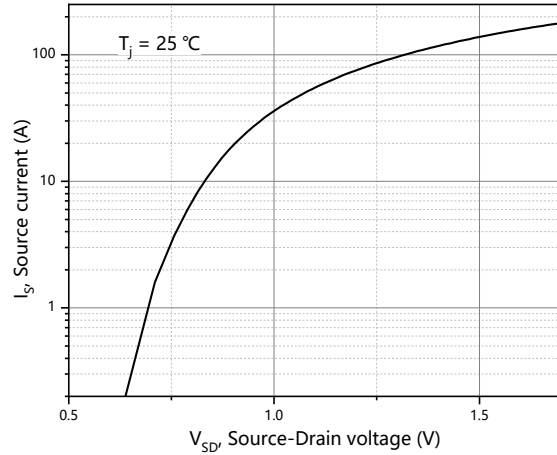


Figure 8. Forward characteristic of body diode

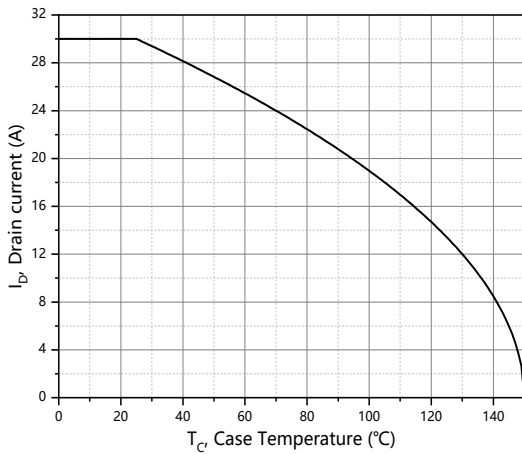


Figure 9. Drain current

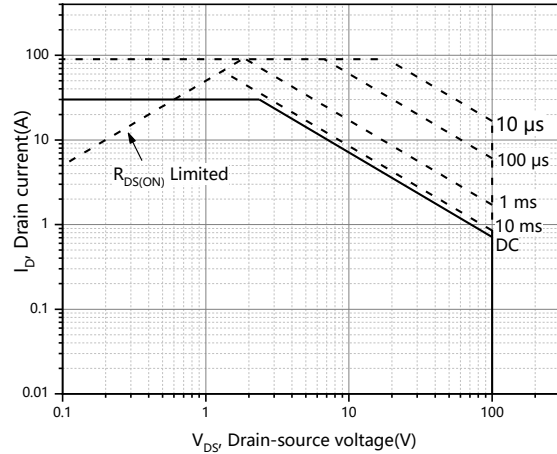
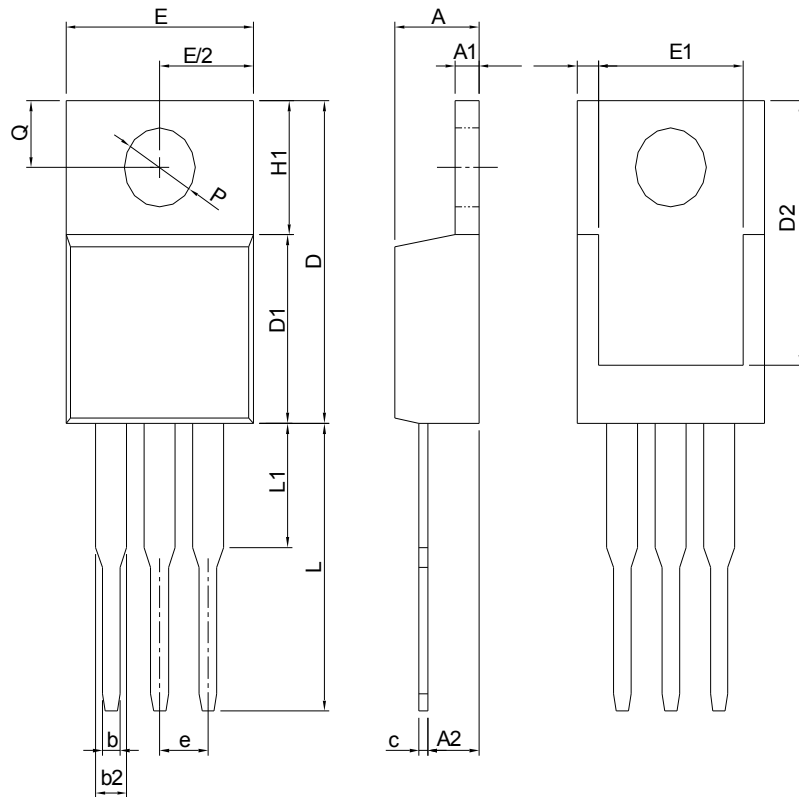


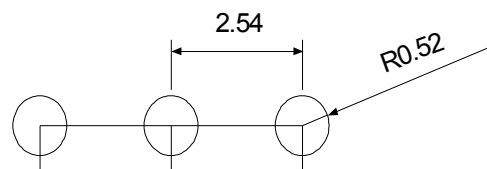
Figure 10. Safe operation area  $T_C=25\text{ °C}$

# Package Information: TO-220AB



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

## RECOMMENDED LAND PATTERN



UNIT: mm

Note: Follow JEDEC TO-220 AB.

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