

## Single N-Channel Enhancement Mode MOSFET

$V_{DS}=88V$ ,  $I_D=110A$ ,  $R_{DS(ON)}=5.4\ m\Omega$

### DESCRIPTION

The OR80H12G is N-Channel logic enhancement mode power field effect transistors designed for high current switching applications.

Rugged  $E_{AS}$  capability and ultra low  $R_{DS(ON)}$  is suitable for PWM, load switching especially for E-Bike controller applications.

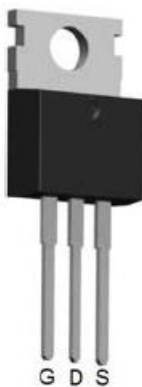
### FEATURE

- ◆  $88V/110A$ :  $R_{DS(ON)} < 6.5m\Omega @ V_{GS}=10V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Special designed for E-bike controller
- ◆ Full RoHS compliance
- ◆ TO-220 package design

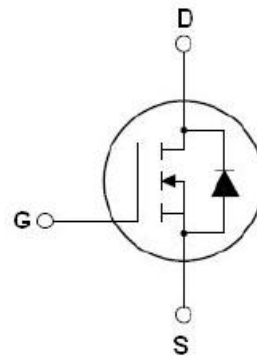
### APPLICATIONS

- ◆ 64V E-bike controller applications
- ◆ Hard switched and high frequency circuits
- ◆ Uninterruptible power supply

### PIN CONFIGURATION



To-220 Top View



Schematic Diagram

## ■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Symbol	Parameter	Typical	Unit
$V_{DSS}$	Drain-Source Voltage	88	V
$V_{GSS}$	Gate-Source Voltage	+25	V
$I_D$	Continuous Drain Current( $T_J=150^{\circ}\text{C}$ )	$V_{GS}=-10\text{V}$	110 A
$I_{DM}$	Pulsed Drain Current	328	A
$T_J$	Operation Junction Temperature	-55~150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range	-55~150	$^{\circ}\text{C}$
$P_D$	Power Dissipation( $T_C=25^{\circ}\text{C}$ )	99	W
$E_{AS}$	Single Pulse Avalanche Energy ( $T_J=25^{\circ}\text{C}, V_{DD}=40\text{V}, V_{GS}=10\text{V}, R_G=25\Omega$ )	625	mJ
$R_{\theta JC}$	Thermal Resistance-Junction to Ambient	1.51	$^{\circ}\text{C}/\text{W}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	-	85	88	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{CS}, I_{DS}=250\mu\text{A}$	2	-	4	V
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$	-	-	+100	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=88\text{V}, V_{GS}=0\text{V}$ $T_C=25^{\circ}\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=88\text{V}, V_{GS}=0\text{V}$ $T_C=125^{\circ}\text{C}$	-	-	10	$\mu\text{A}$
$R_{DS(ON)}$	Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_{DS}=40\text{A}$	-	5.5	6.8	m $\Omega$
Source-Drain Diode						
$I_S$	Diode Forward Current (Max.)		-	110	-	A
$V_{SD}$	Diode Forward Voltage	$I_S=40\text{A}, V_{GS}=0\text{V}$		0.9	0.99	V
Dynamic Parameters						
$Q_g$	Total Gate Charge	$V_{DS}=20\text{V}, V_{GS}=10\text{V}$ $I_D=40\text{A}$	-	47	-	nC
$Q_{gs}$	Gate-Source Charge		-	14.6	-	
$Q_{gd}$	Gate-Drain Charge		-	12	-	
$C_{iss}$	Input Capacitance	$V_{DS}=25\text{V}, V_{GS}=0\text{V}$ $F=1\text{MHz}$	-	3016	-	pF
$C_{oss}$	Output Capacitance		-	1051	-	
$C_{rss}$	Reverse Transfer Capacitance		-	106	-	
$t_{d(on)}$	Turn-On Time	$V_{DS}=30\text{V}, R_L=15\Omega$ $V_{GS}=10\text{V}, R_G=2.5\Omega$	-	15	-	nS
$t_r$			-	32.3	-	
$t_{d(off)}$	Turn-Off Time		-	24	-	
$t_f$			-	15	-	

Note: 1. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ ;

2. Static parameters are based on package level with recommended wire-bonding

**TYPICAL CHARACTERISTICS** ( $T_A=25^{\circ}C$  Unless otherwise noted) (Continue)

Figure1. Output Characteristics

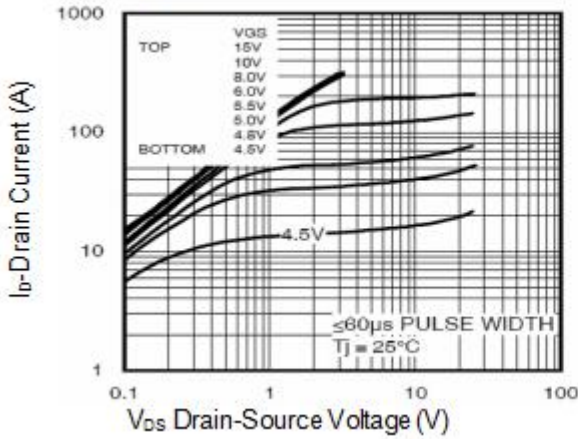


Figure2. Transfer Characteristics

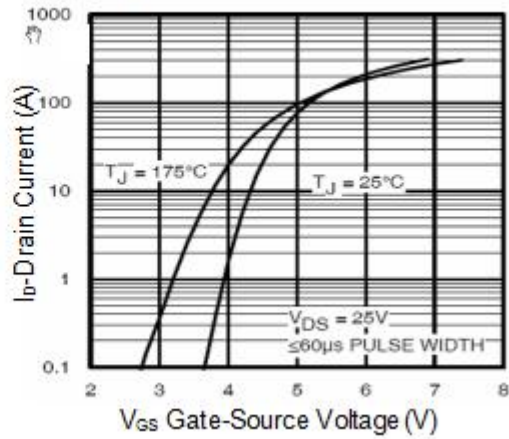


Figure3. BVDSS vs Junction Temperature

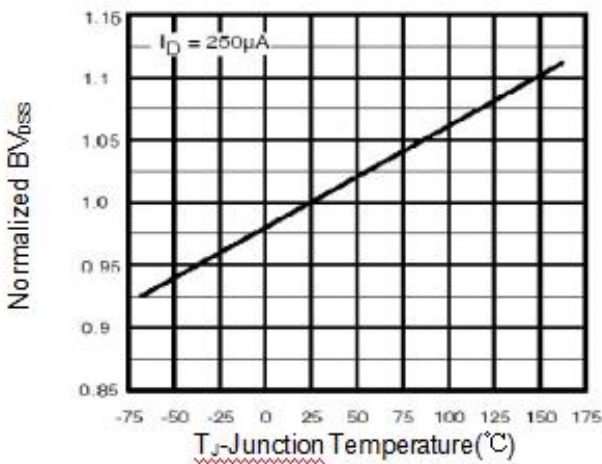


Figure4. ID vs Junction Temperature

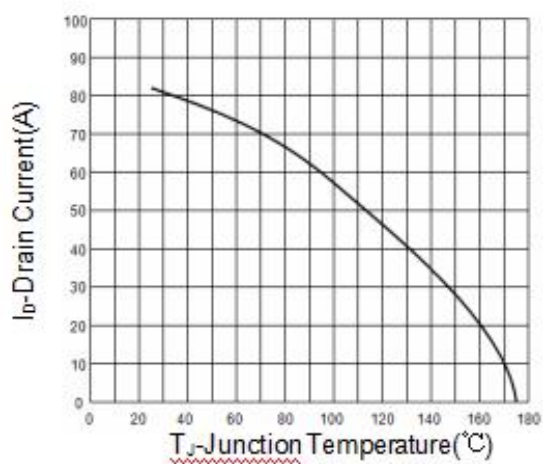


Figure5. VGS(th) vs Junction Temperature

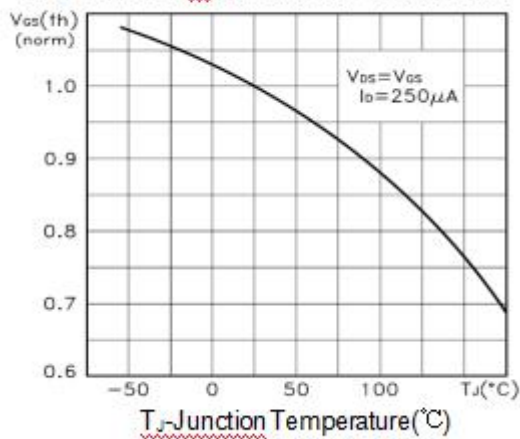


Figure6. Rdson Vs Junction Temperature

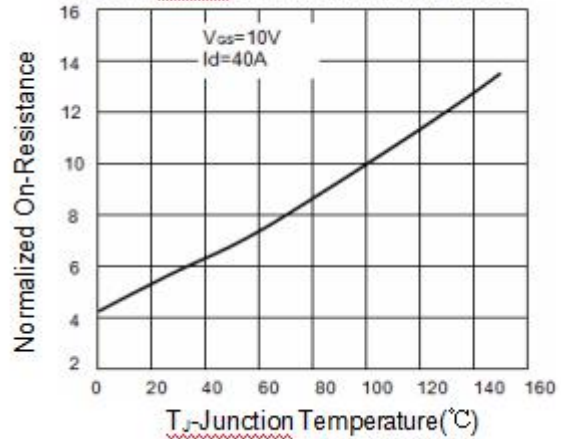


Figure7. Gate Charge

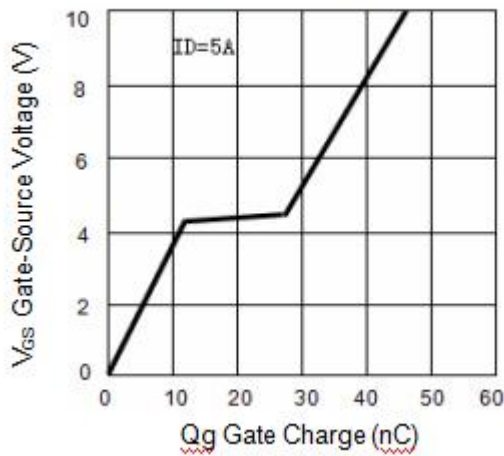


Figure8. Capacitance vs Vds

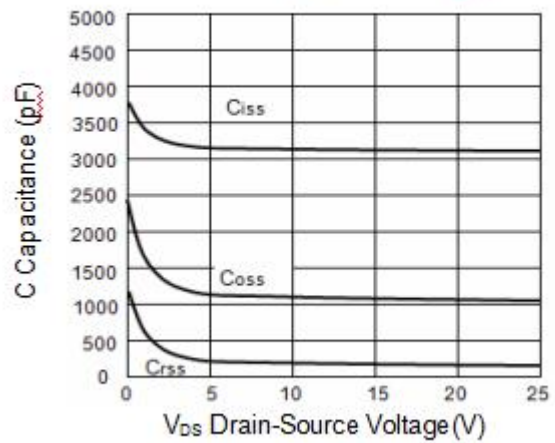


Figure9. Source- Drain Diode Forward

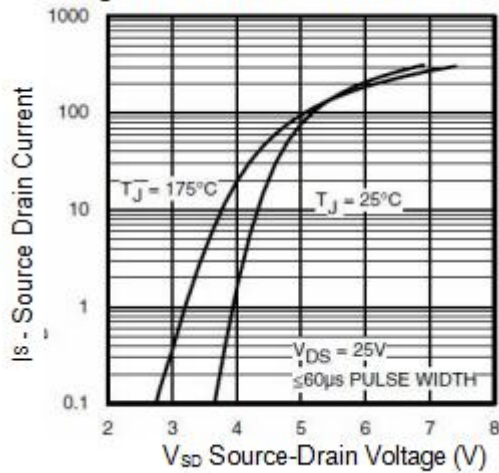


Figure10. Safe Operation Area

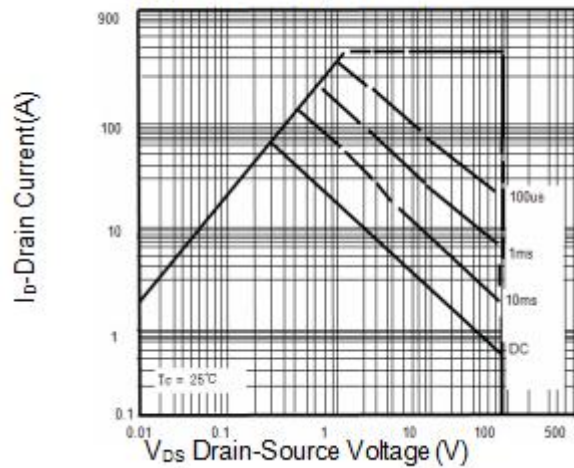
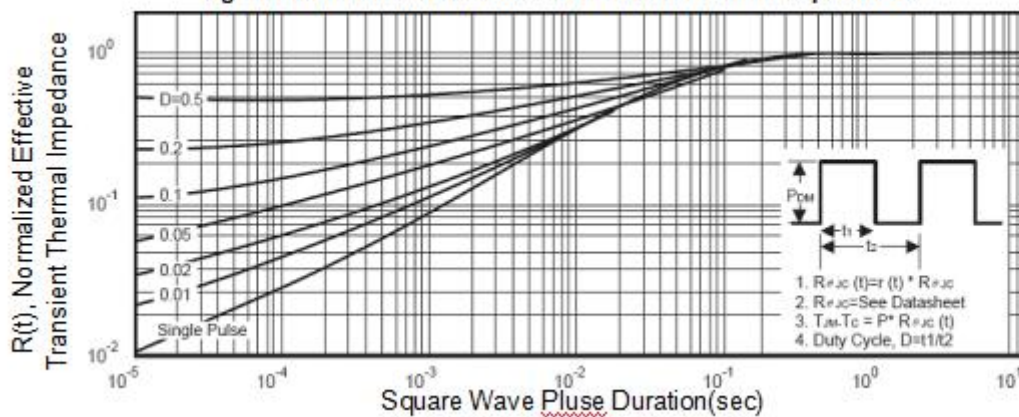
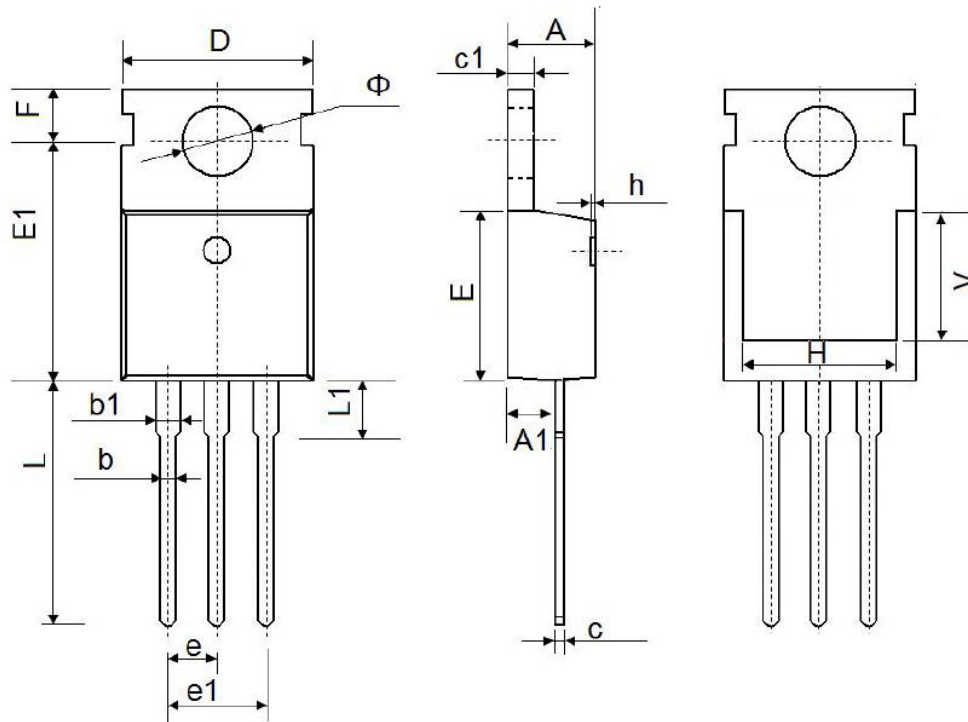


Figure11. Normalized Maximum Transient Thermal Impedance



## T0-220 PACKAGE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150