

Single N-Channel Enhancement Mode MOSFET

$V_{DS}=85V$, $I_D=92A$, $R_{DS(ON)}=6.2\ m\Omega$

DESCRIPTION

The OR8090 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.

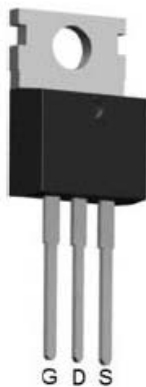
FEATURE

- ◆ $85V/92A$: $R_{DS(ON)} < 7.45m\Omega @ V_{GS}=10V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Special designed for E-bike controller
- ◆ Full RoHS compliance
- ◆ TO-220 package design

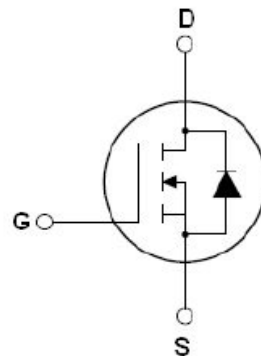
APPLICATIONS

- ◆ 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	85	V
V_{GSS}	Gate-Source Voltage	+25	V
I_D	Continuous Drain Current($T_J=150^{\circ}\text{C}$)	$V_{GS}=-10\text{V}$ 92	A
I_{DM}	Pulsed Drain Current	368	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($T_C=25^{\circ}\text{C}$)	139	W
E_{AS}	Single Pulse Avalanche Energy ($T_J=25^{\circ}\text{C}, V_{DD}=40\text{V}, V_{GS}=10\text{V}, R_G=25\Omega$)	550	mJ
$R_{\theta JC}$	Thermal Resistance-Junction to Ambient	1.08	$^{\circ}\text{C}/\text{W}$

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	$V_{GS}=0\text{V}, I_{DS}=250\mu\text{A}$	82	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	2	-	4	V
I_{GSS}	Gate Leakage Current	$V_{DS}=0\text{V}, V_{GS}=+20\text{V}$	-	-	+100	nA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=82\text{V}, V_{GS}=0\text{V}$ $T_C=25^{\circ}\text{C}$	-	-	1	μA
		$V_{DS}=82\text{V}, V_{GS}=0\text{V}$ $T_C=125^{\circ}\text{C}$	-	-	10	μA
$R_{DS(ON)}$	Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_{DS}=40\text{A}$	-	6.2	7.45	m Ω
Source-Drain Diode						
I_S	Diode Forward Current (Max.)		-	92	-	A
V_{SD}	Diode Forward Voltage	$I_S=40\text{A}, V_{GS}=0\text{V}$		0.78	0.95	V
Dynamic Parameters						
Q_g	Total Gate Charge	$V_{DS}=50\text{V}, V_{GS}=10\text{V}$ $I_D=40\text{A}$	-	106	-	nC
Q_{gs}	Gate-Source Charge		-	19	-	
Q_{gd}	Gate-Drain Charge		-	47.9	-	
C_{iss}	Input Capacitance	$V_{DS}=25\text{V}, V_{GS}=0\text{V}$ $F=1\text{MHz}$	-	5053	-	pF
C_{oss}	Output Capacitance		-	442	-	
C_{riss}	Reverse Transfer Capacitance		-	145	-	
$t_{d(on)}$	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			-	18	-	
$t_{d(off)}$	Turn-Off Time		-	31	-	
t_f			-	38	-	

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)

Figure1. Output Characteristics

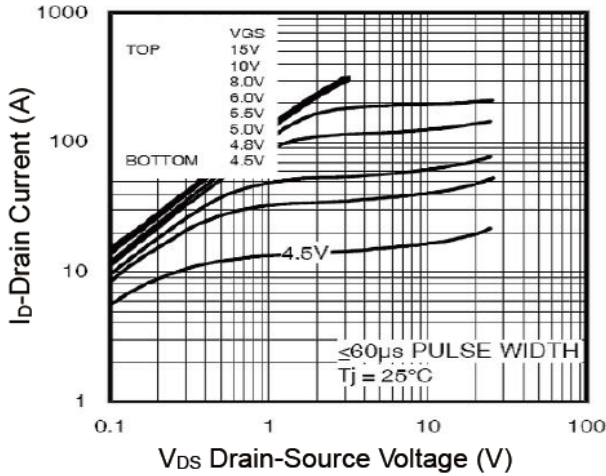


Figure2. Transfer Characteristics

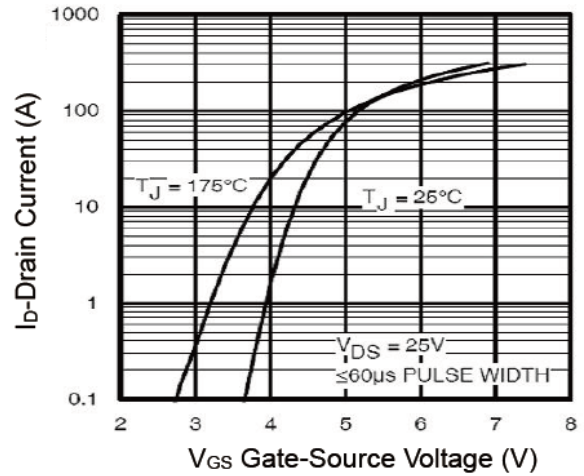


Figure3. Rdson Vs Drain Current

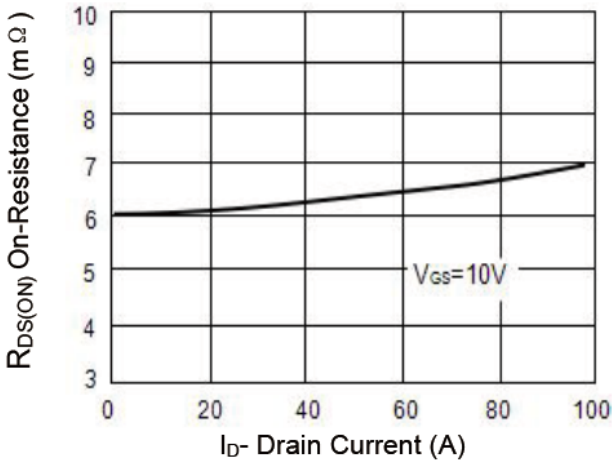


Figure4. Rdson Vs Junction Temperature

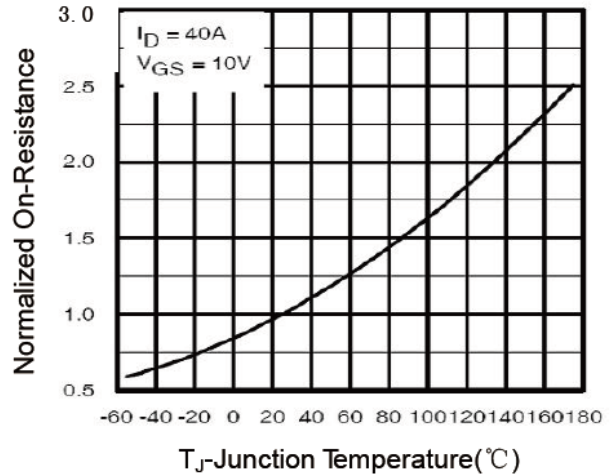


Figure5. Gate Charge

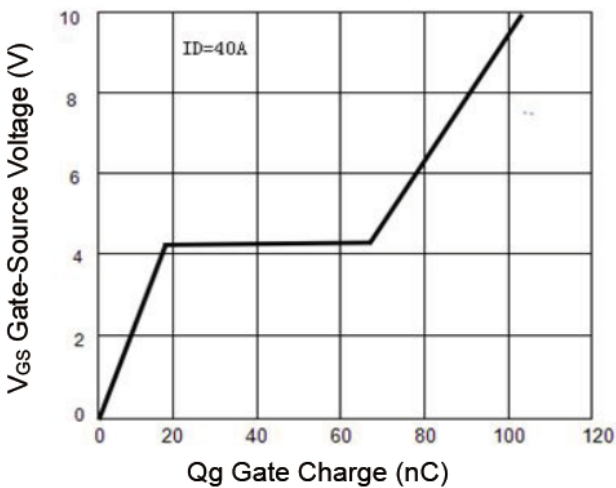
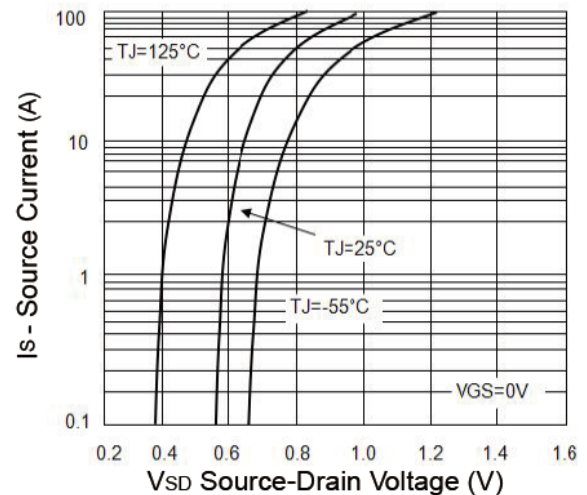


Figure6. Source- Drain Diode Forward



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

Figure7. Capacitance vs Vds

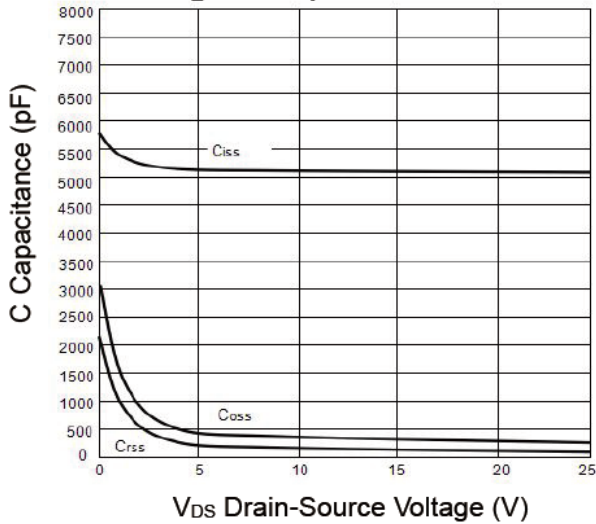


Figure8. Safe Operation Area

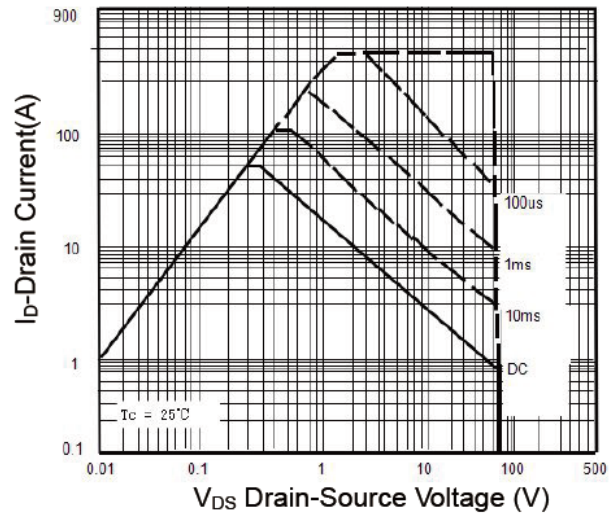


Figure9. BVDS vs Junction Temperature

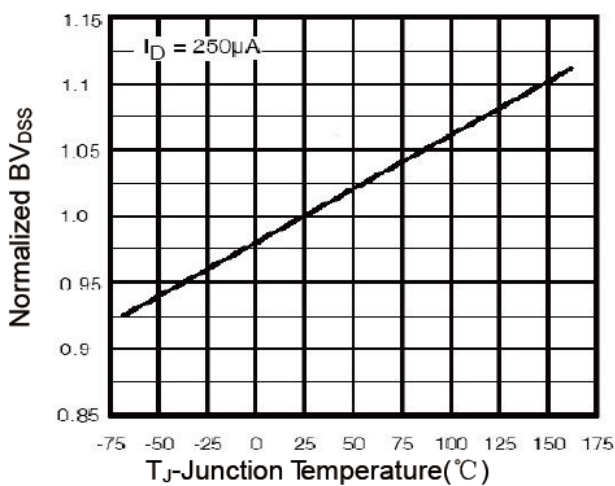


Figure10. VGS(th) vs Junction Temperature

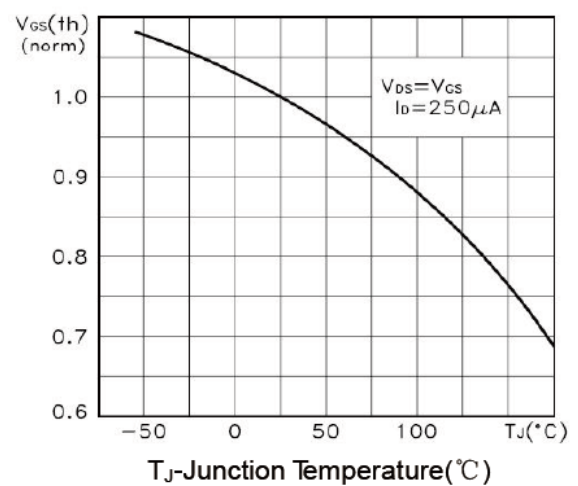
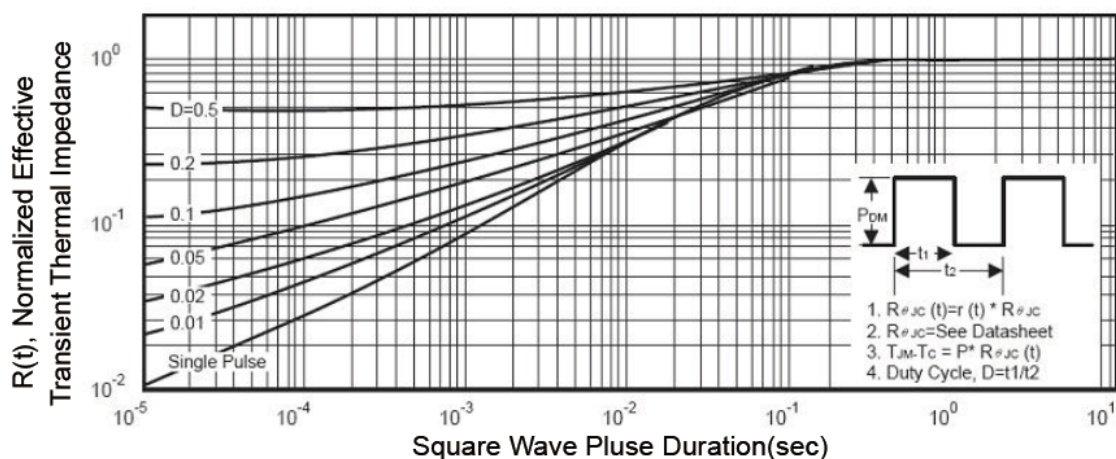
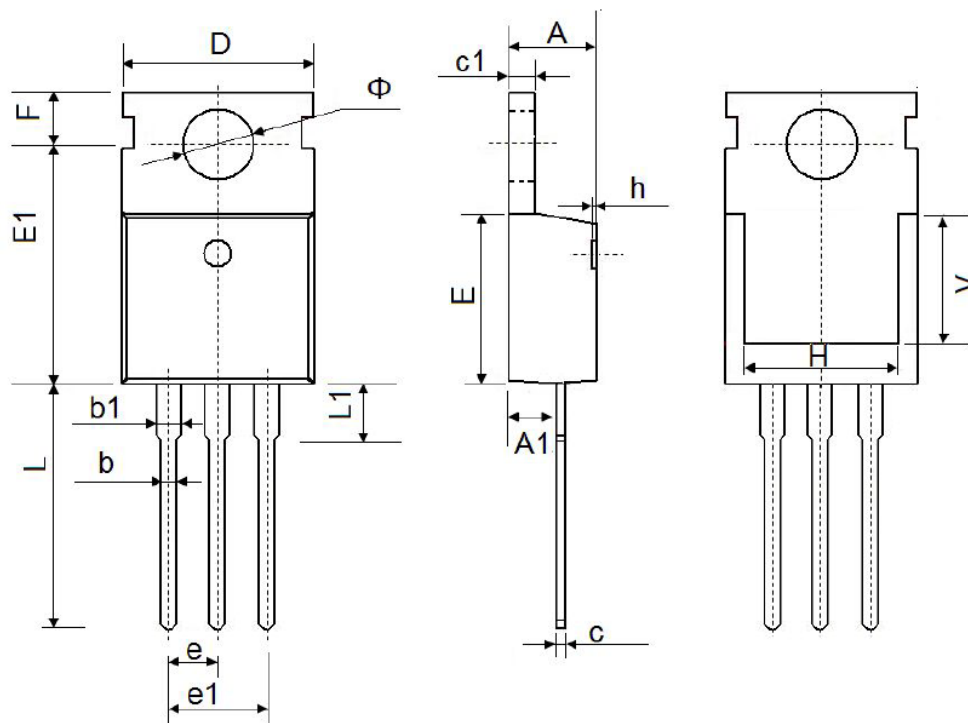


Figure11. Normalized Maximum Transient Thermal Impedance



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