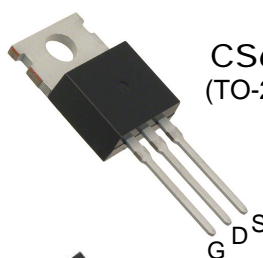
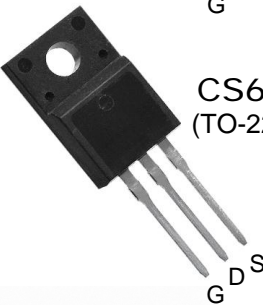
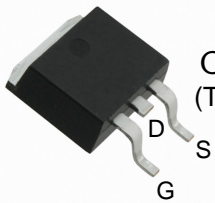
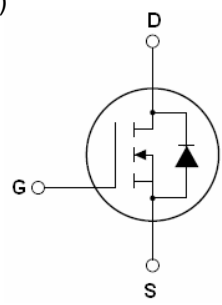




Pb Free Plating Product

## CS64N90

85V,92A N-Channel Trench Process Power MOSFET

<p><b>General Description</b></p> <p>CS64N90 series is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged EAS capability and ultra low <math>R_{DS(ON)}</math> is suitable for PWM, load switching especially for E-Bike controller applications.</p> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS}=85V</math>; <math>I_D=92A@V_{GS}=10V</math>; <math>R_{DS(ON)}&lt;7.45m\Omega @V_{GS}=10V</math></li> <li>● Special Designed for E-Bike Controller Application</li> <li>● Ultra Low On-Resistance</li> <li>● High UIS and UIS 100% Test</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● 64V E-Bike Controller Applications</li> <li>● Hard Switched and High Frequency Circuits</li> <li>● Uninterruptible Power Supply</li> <li>● Inverter Application</li> <li>● Amplifier Application</li> </ul>	 <p>CS64N90 (TO-220 HeatSink)</p>  <p>CS64N90F (TO-220F FullPak)</p>  <p>CS64N90B (TO-263/D2PAK)</p>  <p>Schematic Diagram</p> <p><math>V_{DS} = 85 V</math></p> <p><math>I_D = 92 A</math></p> <p><math>R_{DS(ON)} = 6.2 m\Omega</math></p>
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**Table 1. Absolute Maximum Ratings (TA=25°C)**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	85	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	$\pm 25$	V
$I_{D(DC)}$	Drain Current (DC) at $T_c=25^\circ C$	92	A
$I_{D(DC)}$	Drain Current (DC) at $T_c=100^\circ C$	64.4	A
$I_{DM(pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	368	A
dv/dt	Peak Diode Recovery Voltage	30	V/ns
$P_D$	Maximum Power Dissipation( $T_c=25^\circ C$ )	139	W
	Derating Factor	0.93	W/°C
EAS	Single Pulse Avalanche Energy (Note 2)	625	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 175	°C

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.EAS condition: $T_J=25^\circ C, V_{DD}=40V, V_G=10V, R_G=25\Omega$

Table 2. Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.08	$^{\circ}C/W$

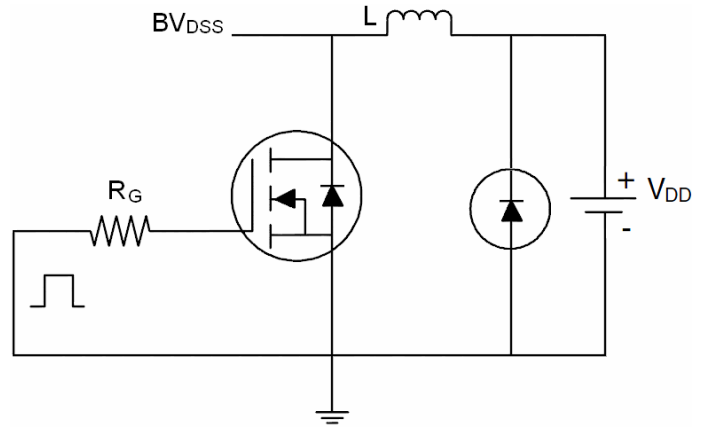
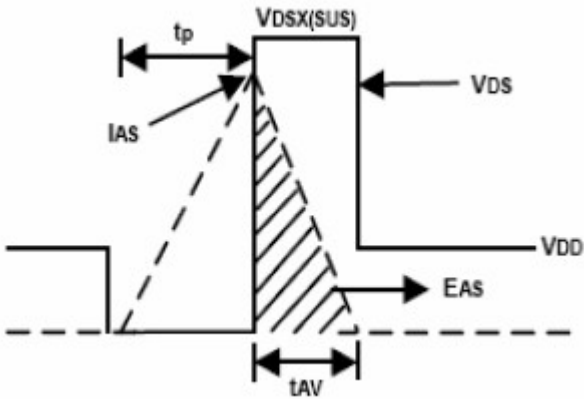
Table 3. Electrical Characteristics (TA=25 $^{\circ}C$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	82			V
$I_{DSS}$	Zero Gate Voltage Drain Current(Tc=25 $^{\circ}C$ )	$V_{DS}=82V, V_{GS}=0V$			1	$\mu A$
$I_{DSS}$	Zero Gate Voltage Drain Current(Tc=125 $^{\circ}C$ )	$V_{DS}=82V, V_{GS}=0V$			10	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=40A$		6.2	7.45	m $\Omega$
<b>Dynamic Characteristics</b>						
$g_{FS}$	Forward Transconductance	$V_{DS}=10V, I_D=15A$	20			S
$C_{iss}$	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$		5053		PF
$C_{oss}$	Output Capacitance			442		PF
$C_{rss}$	Reverse Transfer Capacitance			145		PF
$Q_g$	Total Gate Charge	$V_{DS}=50V, I_D=40A,$ $V_{GS}=10V$		106		nC
$Q_{gs}$	Gate-Source Charge			19		nC
$Q_{gd}$	Gate-Drain Charge			47.9		nC
<b>Switching Times</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=30V, I_D=40A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$		15		nS
$t_r$	Turn-on Rise Time			18		nS
$t_{d(off)}$	Turn-Off Delay Time			31		nS
$t_f$	Turn-Off Fall Time			38		nS
<b>Source-Drain Diode Characteristics</b>						
$I_{SD}$	Source-drain Current(Body Diode)			92		A
$I_{SDM}$	Pulsed Source-Drain Current(Body Diode)			368		A
$V_{SD}$	Forward On Voltage <sup>(Note 1)</sup>	$T_J=25^{\circ}C, I_{SD}=40A, V_{GS}=0V$		0.78	0.95	V
$t_{rr}$	Reverse Recovery Time <sup>(Note 1)</sup>	$T_J=25^{\circ}C, I_F=75A$ $di/dt=100A/\mu s$		56		nS
$Q_{rr}$	Reverse Recovery Charge <sup>(Note 1)</sup>			113		nC
$t_{on}$	Forward Turn-on Time	Intrinsic turn-on time is negligible(turn-on is dominated by $L_S+L_D$ )				

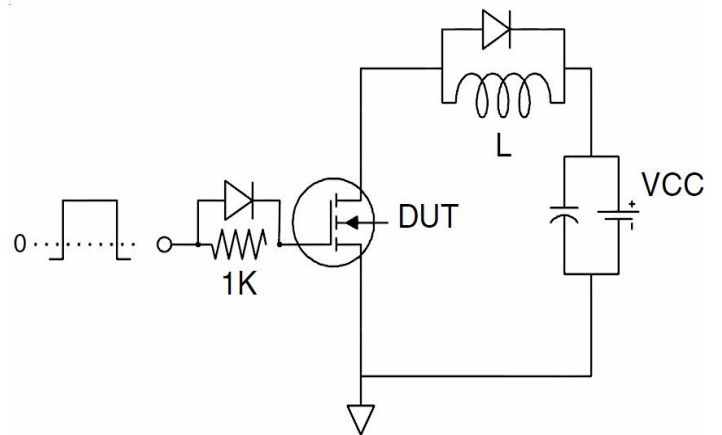
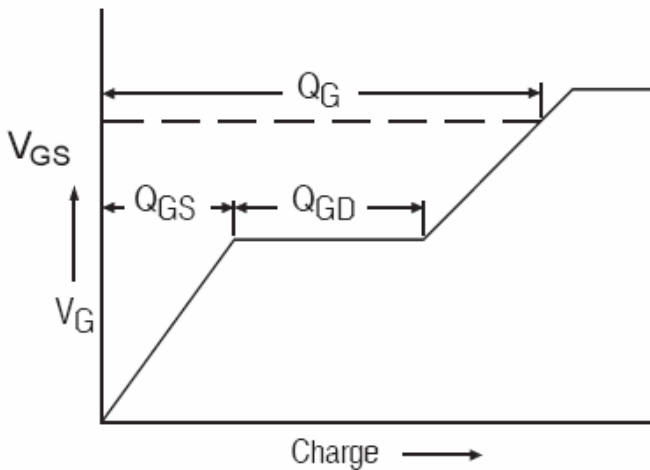
Notes 1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 1.5\%$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}C$

## Test Circuit

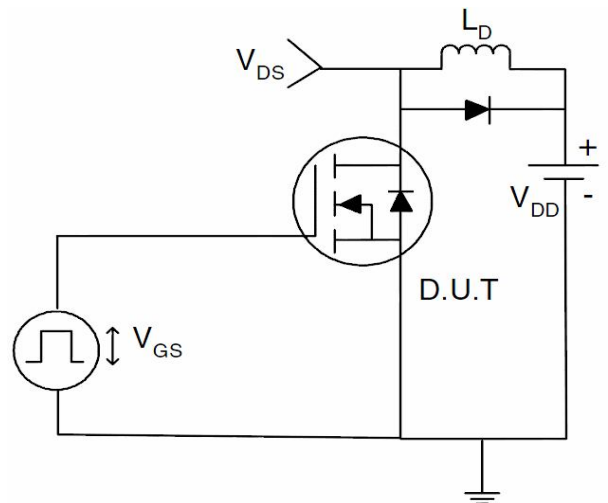
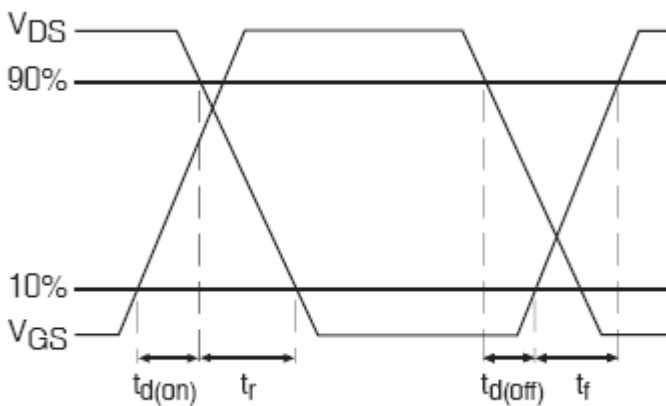
### 1) $E_{AS}$ Test Circuits



### 2) Gate Charge Test Circuit:



### 3) Switch Time Test Circuit:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

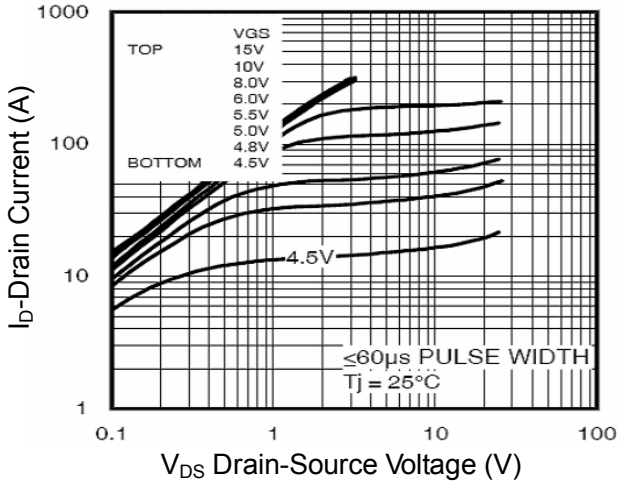


Figure2. Transfer Characteristics

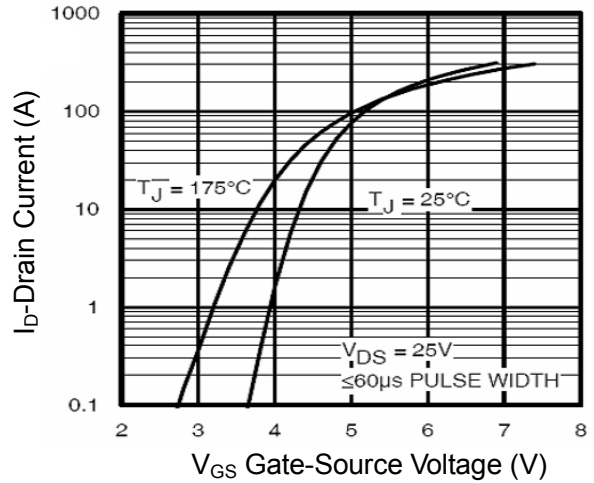


Figure3. Rdson Vs Drain Current

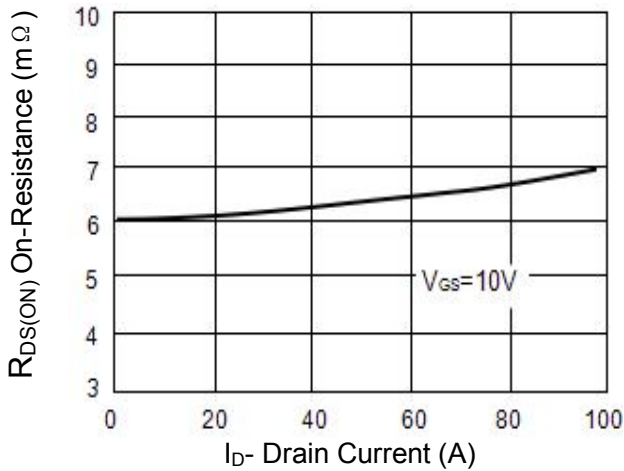


Figure4. Rdson Vs Junction Temperature

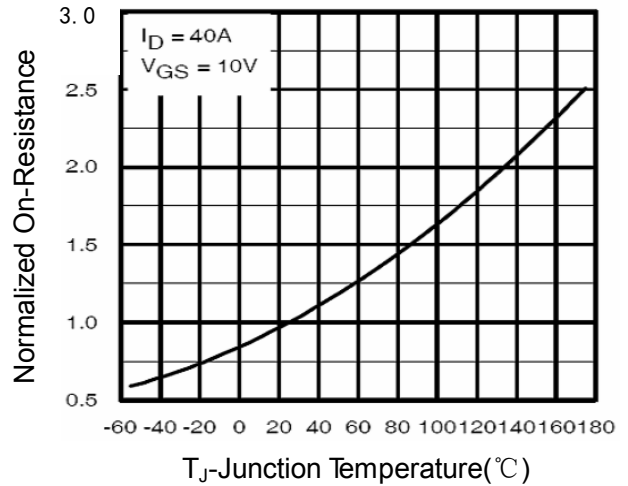


Figure5. Gate Charge

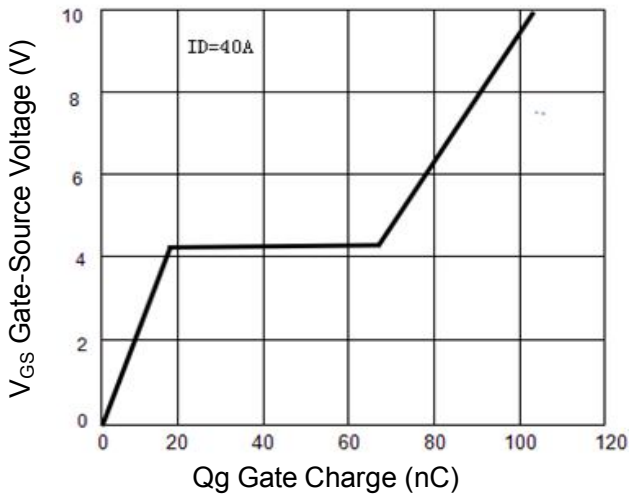


Figure6. Source- Drain Diode Forward

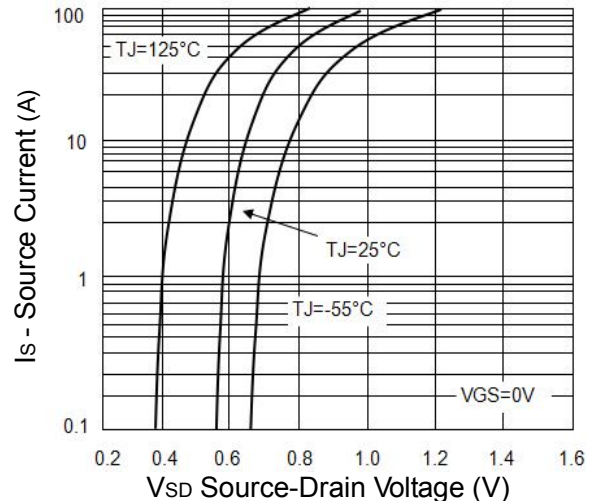


Figure7. Capacitance vs Vds

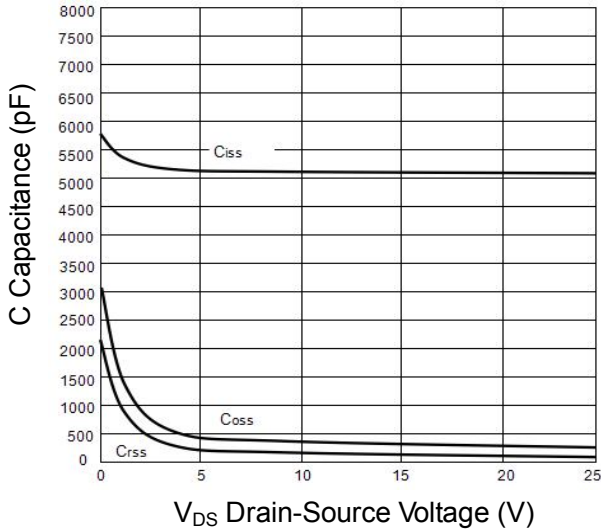


Figure8. Safe Operation Area

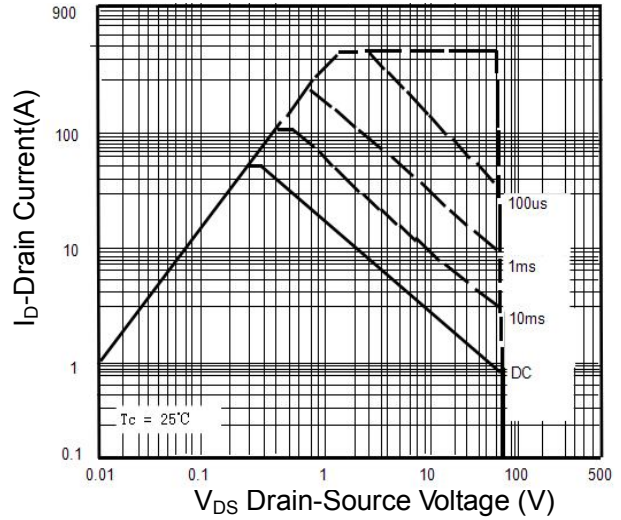


Figure9. BVDSS vs Junction Temperature

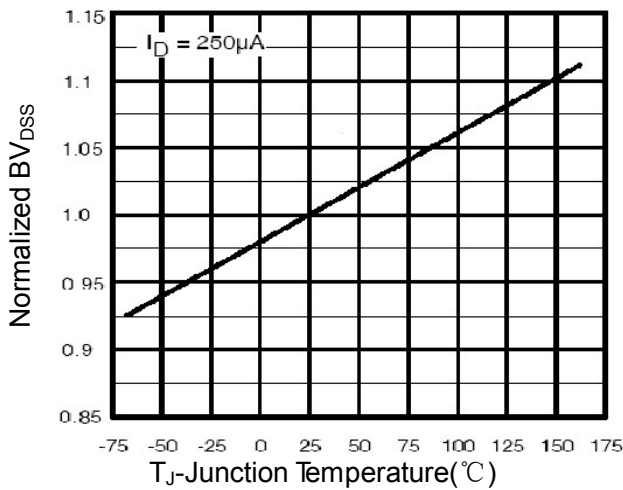


Figure10. VGS(th) vs Junction Temperature

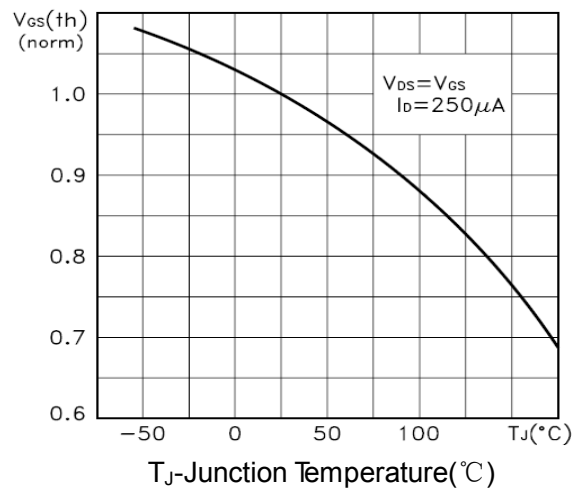


Figure11. Normalized Maximum Transient Thermal Impedance

