

**650V N-CHANNEL ENHANCEMENT MODE MOSFET**

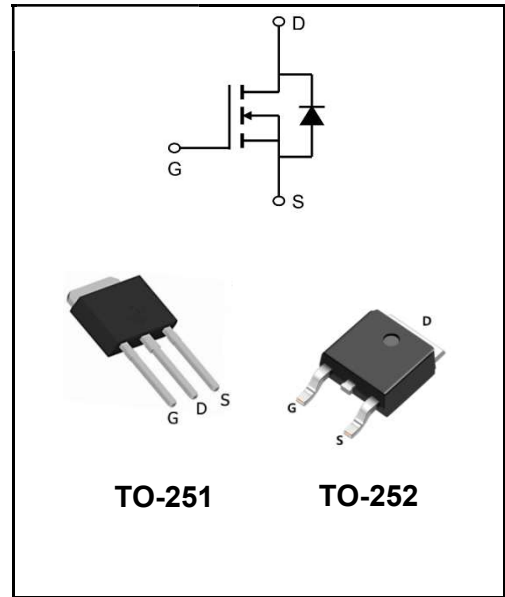
**MAIN CHARACTERISTICS**

$I_D$	4A
$V_{DSS}$	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	< 2.4Ω (Type:2Ω)



**Application**

- ◆ Uninterruptible Power Supply(UPS)
- ◆ Power Factor Correction (PFC)



**Product Specification Classification**

Part Number	Package	Marking	Pack
YFW4N65AD	TO-252	YFW 4N65AD XXXXX	2500PCS/Tape
YFW4N65AMJ	TO-251	YFW 4N65AMJ XXXXX	4000PCS/Tape

**Maximum Ratings at Tc=25°C unless otherwise specified**

Characteristics	Symbols	Value	Units
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DS}$	650	V
Continuous Drain Current	$I_D$	4	A
Pulsed Drain Current (Note1)	$I_{DM}$	16	A
Gate - Source Voltage	$V_{GS}$	±30	V
Single Pulse Avalanche Energy (Note2)	$E_{AS}$	160	mJ
Avalanche Current (Note1)	$I_{AR}$	4	A
Repetitive Avalanche Energy (Note1)	$E_{AR}$	20	mJ
Power Dissipation(TC=25°C)	$P_D$	36	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	°C
Thermal Resistance, Junction-to-case	$R_{\theta JC}$	3.47	°C/W
Thermal Resistance, Junction ambient	$R_{\theta JA}$	62.5	°C/W

**Maximum Ratings at Tc=25°C unless otherwise specified**

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	<b>V(BR)DSS</b>	650	-	-	<b>V</b>
Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$	<b>I<sub>DSS</sub></b>	-	-	1	<b>μA</b>
Gate-Source Leakage	$V_{GS}=\pm 30V$	<b>I<sub>GSS</sub></b>	-	-	±100	<b>nA</b>
Gate-Source Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	<b>V<sub>GS(th)</sub></b>	3.0	-	4	<b>V</b>
Drain-Source On-Resistance (Note3)	$V_{GS}=10V, I_D=2.0A$	<b>R<sub>DS(ON)</sub></b>	-	2	2.4	<b>Ω</b>
Input Capacitance	$V_{DS}=25V$ $V_{GS}=0V$ $f=1MHz$	<b>C<sub>iss</sub></b>	-	580	-	<b>pF</b>
Output Capacitance		<b>C<sub>oss</sub></b>	-	69.5	-	
Reverse Transfer Capacitance		<b>C<sub>rss</sub></b>	-	10.9	-	
Total Gate Charge	$V_{DD}=520V$ $I_D=4A$ $V_{GS}=10V$	<b>Q<sub>g</sub></b>	-	15	-	<b>nC</b>
Gate-Source Charge		<b>Q<sub>gs</sub></b>	-	2.5	-	
Gate-Drain Charge		<b>Q<sub>gd</sub></b>	-	7.5	-	
Turn-on delay time	$V_{DD}=400V$ $I_D=4A$ $R_G=25\Omega$	<b>t<sub>d(on)</sub></b>	-	12	-	<b>ns</b>
Turn-on Rise Time		<b>T<sub>r</sub></b>	-	22	-	
Turn-Off Delay Time		<b>t<sub>d(OFF)</sub></b>	-	50	-	
Turn-on Fall Time		<b>t<sub>f</sub></b>	-	48	-	
Continuous Body Diode Current	$T_C=25^\circ C$	<b>I<sub>S</sub></b>	-	-	4	<b>A</b>
Pulsed Diode Forward Current		<b>I<sub>SM</sub></b>	-	-	16	
Body Diode Voltage	$T_J=25^\circ C, I_{SD}=4A, V_{GS}=0V$	<b>V<sub>SD</sub></b>	-	-	1.4	<b>V</b>
Reverse Recovery Time	$V_{GS}=0V, I_S=4A$ $diF/dt=100A/\mu s$	<b>t<sub>rr</sub></b>	-	250	-	<b>nS</b>
Reverse Recovery Charge		<b>Q<sub>rr</sub></b>	-	3.5	-	<b>uC</b>

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $I_{AS}=4A, V_{DD}=50V, R_G=25\Omega$ , Starting  $T_J=25^\circ C$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

Ratings and Characteristic Curves

Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )

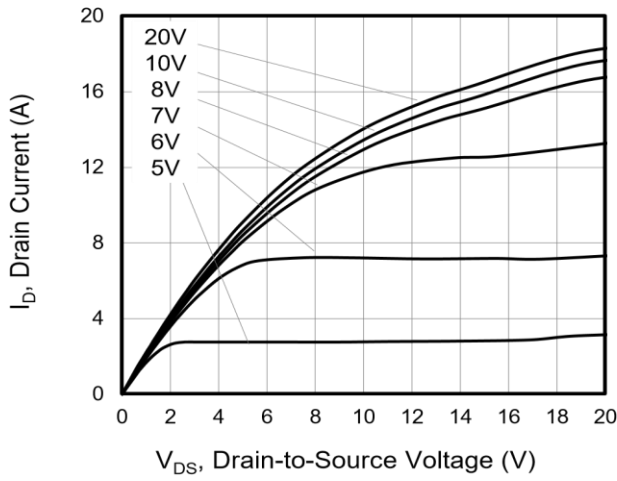
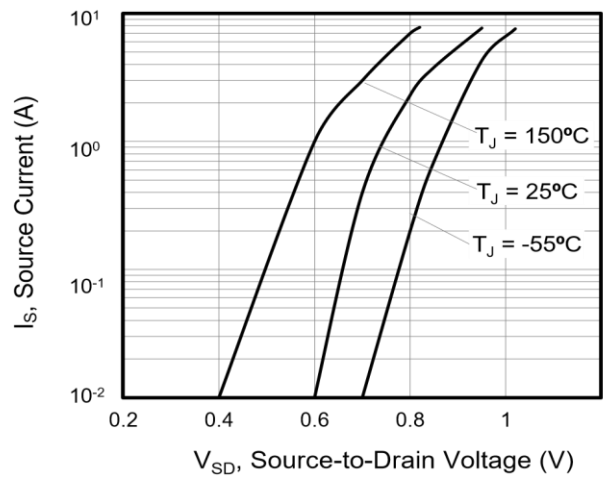


Figure 2. Body Diode Forward Voltage



1.2

Figure 3. Drain Current vs. Temperature

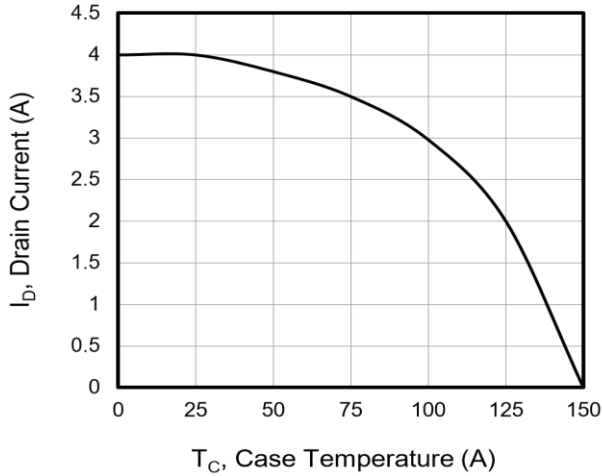


Figure 4. Power Dissipation vs. Temperature

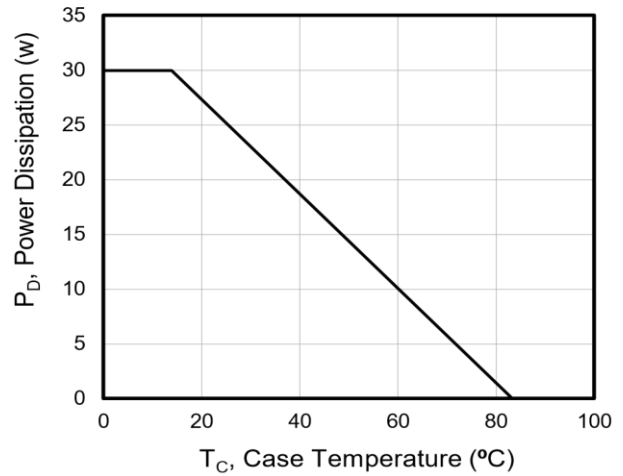


Figure 5. Transfer Characteristics

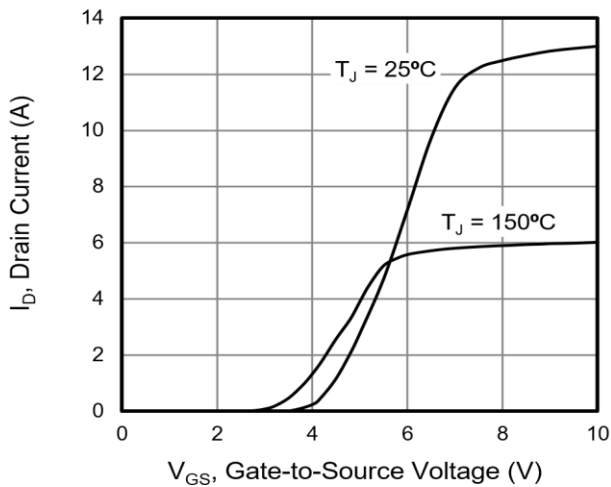
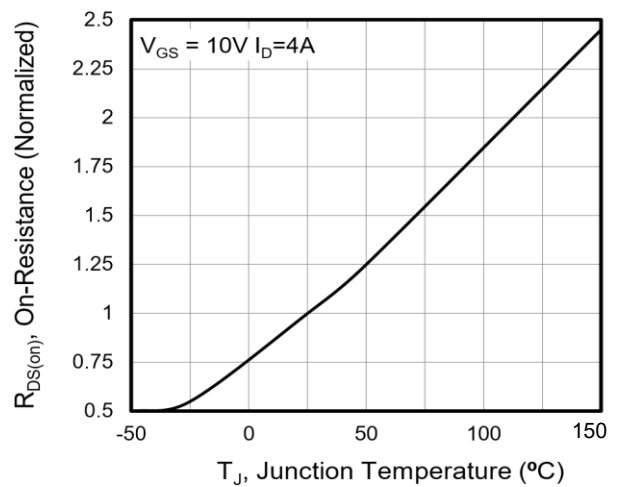


Figure 6. On-Resistance vs. Temperature



Ratings and Characteristic Curves

Figure 7. Capacitance

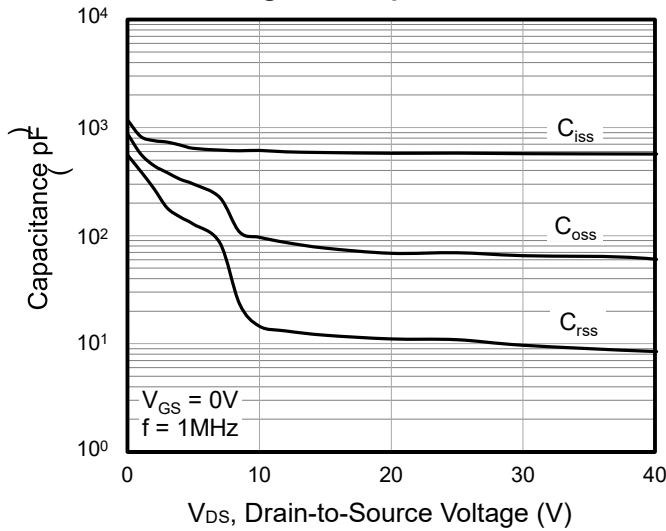


Figure 8. Gate Charge

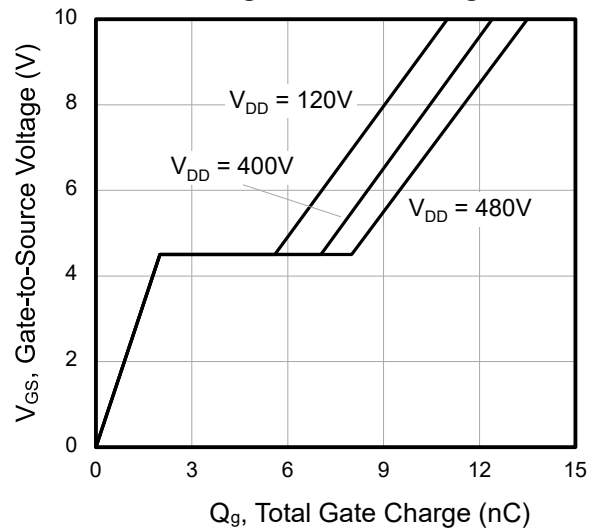


Figure 9. Transient Thermal Impedance TO-220F

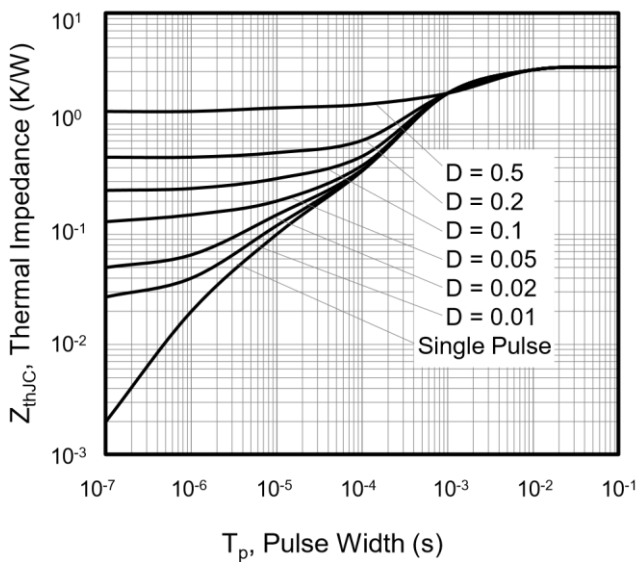
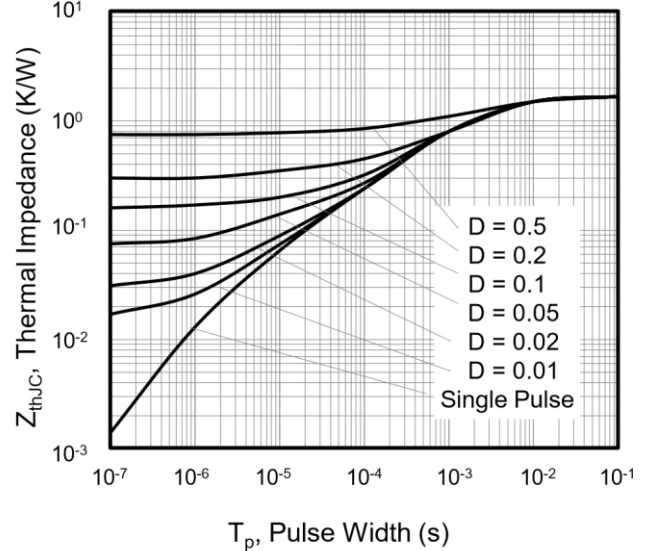


Figure 10. Transient Thermal Impedance TO-220



Ratings and Characteristic Curves

Figure A: Gate Charge Test Circuit and Waveform

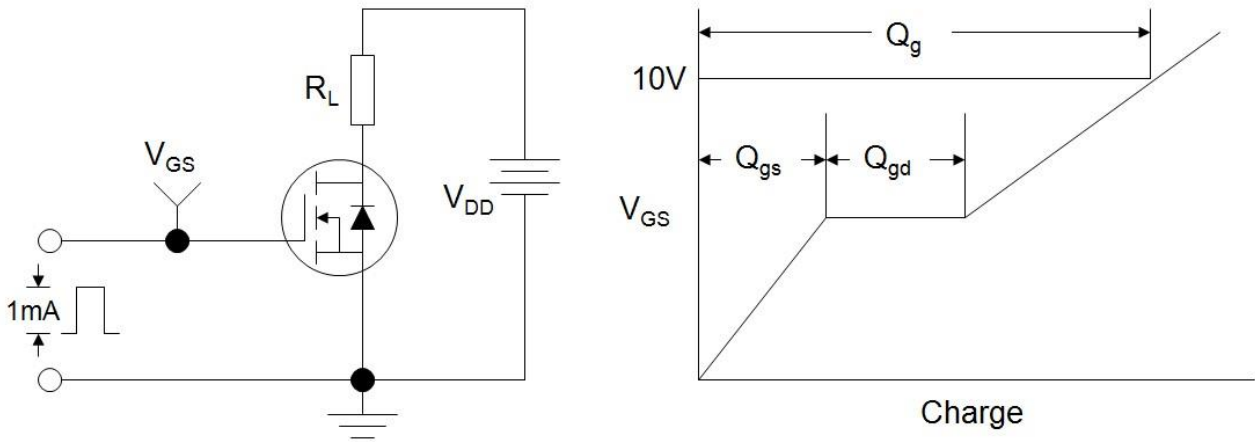


Figure B: Resistive Switching Test Circuit and Waveform

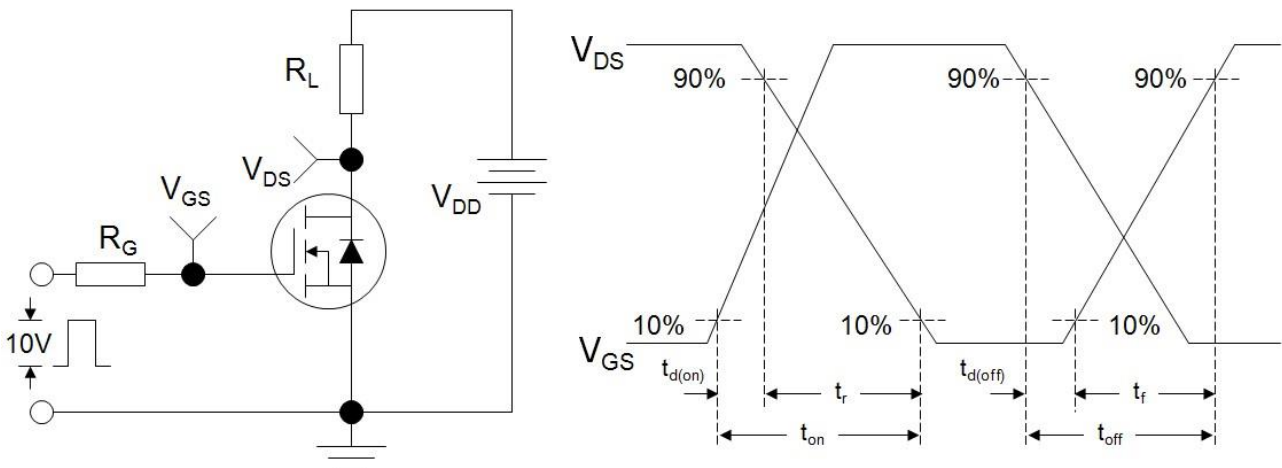
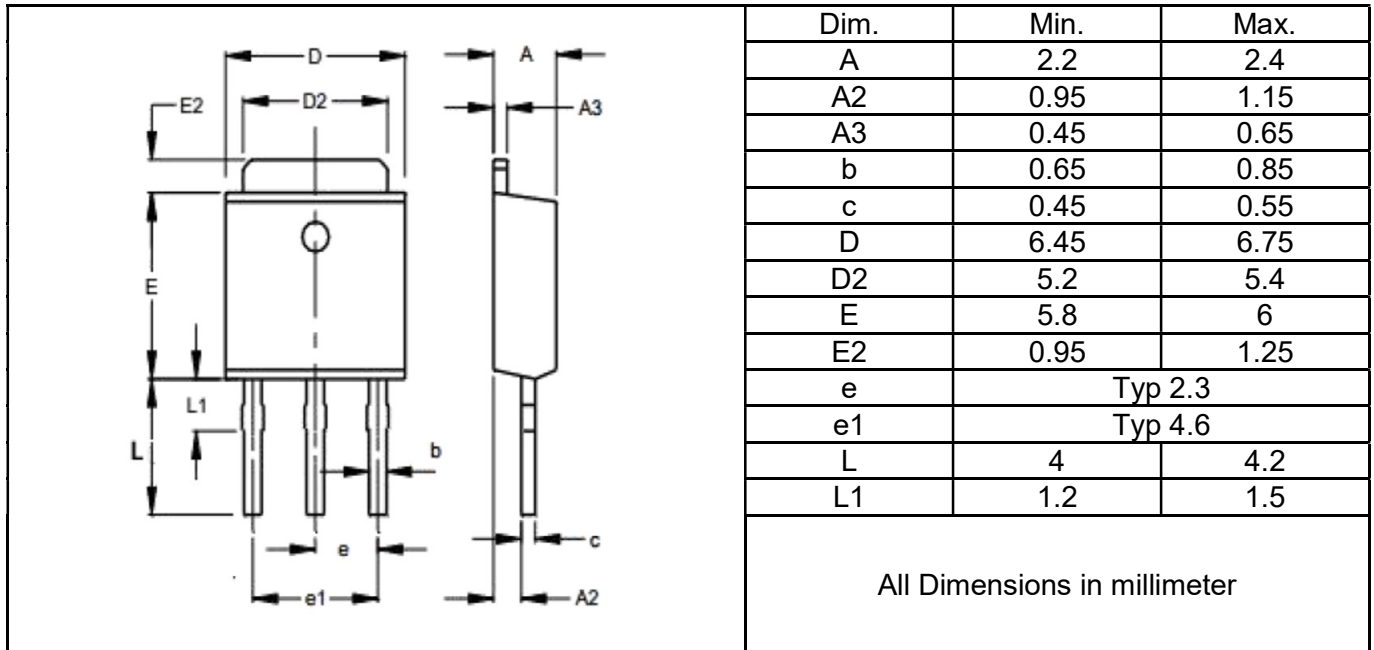


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

Package Outline Dimensions Millimeters

TO-251



TO-252

