

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

**MAIN CHARACTERISTICS**

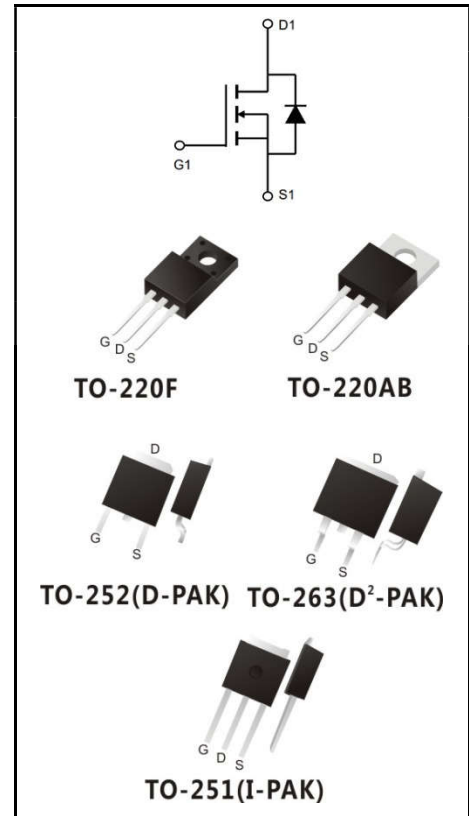
<b>I<sub>D</sub></b>	4A
<b>V<sub>DSS</sub></b>	650V
<b>R<sub>DS(on)-typ(@V<sub>GS</sub>=10V)</sub></b>	<2.8Ω( <b>Type:2.5 Ω</b> )

**Features**

- ◆Fast Switching
- ◆Low ON Resistance
- ◆Low Gate Charge
- ◆100% Single Pulse avalanche energy Test
- ◆LeadfreeincomplywithEUroHS2011/65/EUdirectives

**Mechanical Data**

- ◆Case: Molded plastic
- ◆Mounting Position: Any
- ◆Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆Solder bath temperature275°C maximum,10s per JESD22-106



**Product Specification Classification**

Part Number	Package	Marking	Pack
YFW4N65AT	TO-220AB	YFW 4N65AT XXXXX	1000PCS/Box
YFW4N65AF	TO-220F(0.5mm)	YFW 4N65AF XXXXX	1000PCS/Box
YFW4N65AS-G	TO-263	YFW 4N65AS XXXXX	1000PCS/Box
YFW4N65AS	TO-263	YFW 4N65AS XXXXX	800PCS/Reel
YFW4N65AMJ	TO-251	YFW 4N65AMJ XXXXX	1000PCS/Box
YFW4N65AD	TO-252	YFW 4N65AD XXXXX	2500PCS/Reel

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

Characteristics	Symbols	Value			Units
		220AB/263	220F	251/252	
Drain-Source Voltage	$V_{DS}$	650			V
Gate-Source Voltage	$V_{GS}$	±30			V
Continue Drain Current -Continuous (TC = 25°C)	$I_D$	4			A
- Continuous(Tc=100°C)		2.6			
Pulsed Drain Current (Note1)	$I_{DM}$	16			A
Power Dissipation (TC = 25°C)	$P_D$	75	33	51	W
-Derate above 25°C		0.62	0.26	0.39	W/°C
Single Pulse Avalanche Energy (Note2)	$E_{AS}$	220			mJ
Avalanche Current (Note 1)	$I_{AR}$	4			A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	10			mJ
Operating Temperature Range	$T_J$	150			°C
Storage Temperature Range	$T_{STG}$	-55 to +150			°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.26	3.94	2.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	62.5	83	°C/W

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

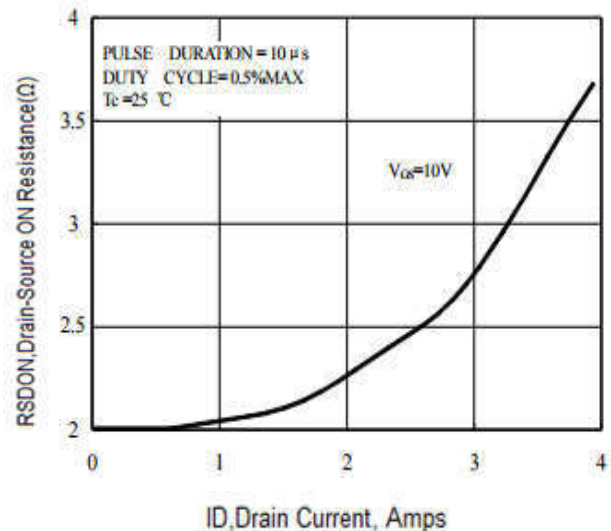
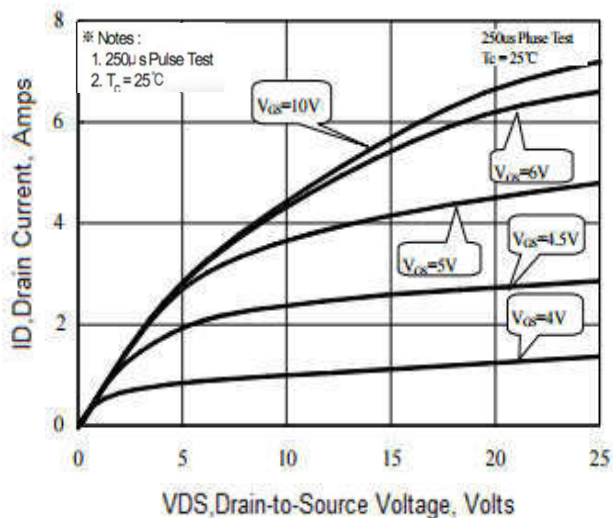
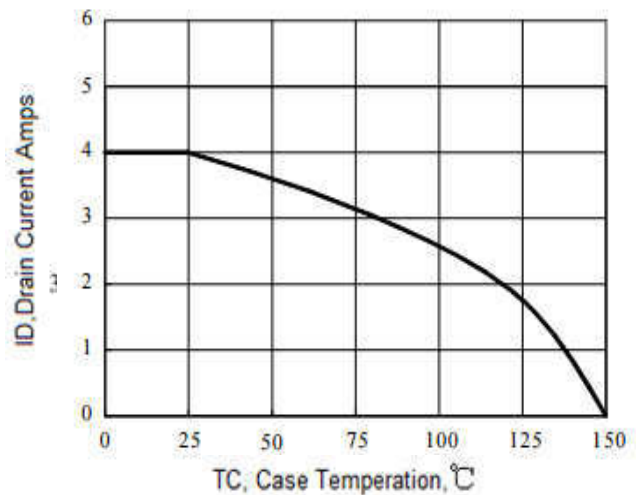
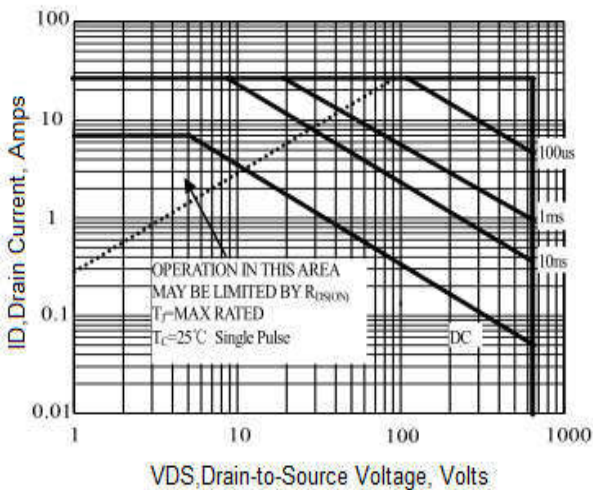
Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS} = 0 V, I_D = 250 \mu A$	$BV_{DSS}$	650	-	-	V
Drain-Source Leakage Current	$V_{DS} = 650 V, V_{GS} = 0 V$	$I_{DSS}$	-	-	1	uA
	$V_{DS} = 520 V, T_C = 125^\circ C$		-	-	10	
Gate Leakage Current	$V_{GS} = \pm 30 V, V_{DS} = 0 V$	$I_{GSS}$	-	-	±100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance	$V_{GS} = 10 V, I_D = 2 A$	$R_{DS(on)}$	-	2.5	2.8	Ω
Forward Transconductance(Note3)	$V_{DS} = 40 V, I_D = 2 A$	$g_{fs}$	-	3.5	-	S
Input Capacitance	$V_{GS} = 0 V, V_{DS} = 25 V, f = 1 KHz$	$C_{iss}$	-	550	-	pF
Output Capacitance		$C_{oss}$	-	53	-	
Reverse Transfer Capacitance		$C_{rss}$	-	4	-	
Turn-on Delay Time	$I_D = 4 A, V_{DD} = 325 V, R_G = 25 \Omega$	$td(ON)$	-	14	-	nS
Rise Time		$tr$	-	16	-	
Turn-Off Delay Time		$td(OFF)$	-	32	-	
Fall Time		$tf$	-	11	-	
Total Gate Charge	$I_D = 4 A, V_{DD} = 520 V, V_{GS} = 10 V(\text{Note3.4})$	$Q_G$	-	15	-	nC
Gate to Source Charge		$Q_{GS}$	-	3	-	
Gate to Drain Charge		$Q_{GD}$	-	7	-	

Source-Drain Diode Characteristics at Ta=25°C unless otherwise specified

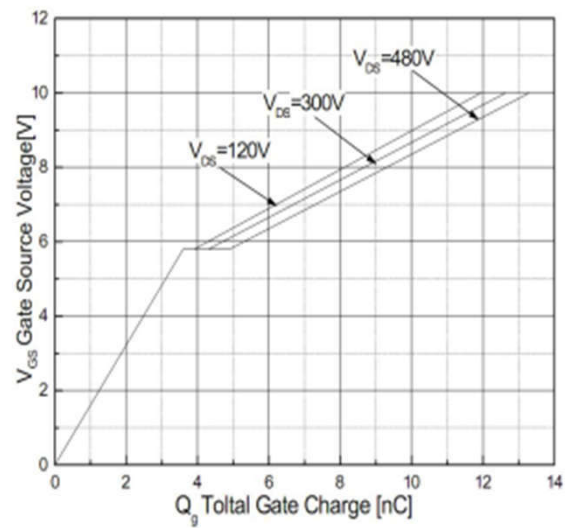
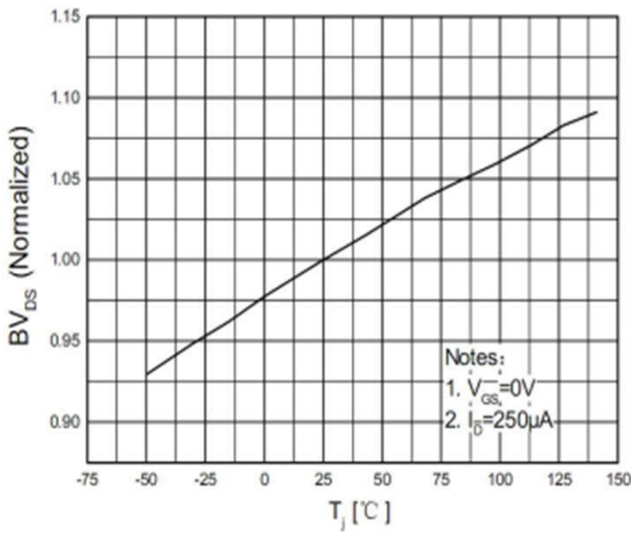
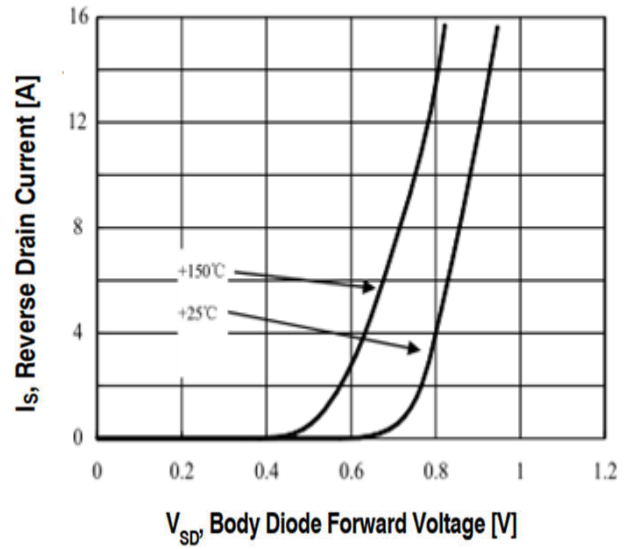
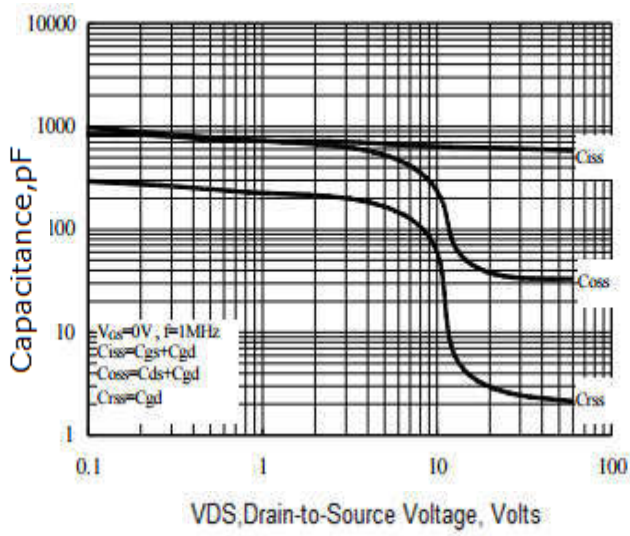
Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Maximum Continuous Drain-Source Diode Forward Current		<b>I<sub>S</sub></b>	-	-	4	<b>A</b>
Maximum Pulsed Drain-Source Diode Forward Current		<b>I<sub>SM</sub></b>	-	-	16	<b>A</b>
Drain-Source Diode Forward Voltage	I <sub>SD</sub> = 4 A	<b>V<sub>SD</sub></b>	-	-	1.4	<b>V</b>
Reverse Recovery Time	I <sub>SD</sub> = 4 A, V <sub>GS</sub> = 0 V, dI <sub>F</sub> / dt = 100 A/μs	<b>trr</b>	-	250	-	<b>nS</b>
Reverse Recovery Charge	(Note3)	<b>Qrr</b>	-	1.2	-	<b>uC</b>

- Note:
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
  2. IAS = 4 A, VDD = 50 V, L = 25mH, RG = 25Ω, starting TJ = 25°C.
  3. ulse test: Pulse Width ≤ 300 μ s, Duty Cycle ≤ 2%.
  4. Essentially Independent of Operating Temperature.

Ratings and Characteristic Curves



Ratings and Characteristic Curves



Package Outline Dimensions Millimeters

TO-220AB

	Dim.	Min.	Max.
	A	10.15	10.35
	B	2.65	2.95
	C	3.70	3.90
	D	28.5	29.5
	E	1.30	1.45
	F	6.35	6.55
	G	2.9	3.3
	H	15.0	16.0
	I	0.38	0.42
	J	4.45	4.55
	K	1.25	1.35
	L	Typ 5.08	
	M	Typ 2.54	
N	3.1	3.3	
O	0.76	0.84	
All Dimensions in millimeter			

TO-220F

	Dim.	Min.	Max.
	A	9.95	10.25
	B	2.95	3.25
	C	1.25	1.45
	D	12.95	13.25
	E	0.50	0.65
	F	3.1	3.3
	G	1.30	1.45
	H	Typ 2.54	
	I	Typ 5.08	
	J	4.60	4.75
	K	2.50	2.65
	L	6.35	6.55
	M	15.4	16.0
N	2.75	3.05	
O	0.48	0.52	
P	0.76	0.84	
All Dimensions in millimeter			

Package Outline Dimensions Millimeters

**TO-263**

	Dim.	Min.	Max.
	A	10.1	10.2
	B	7.4	7.6
	C	1.3	1.5
	D	0.55	0.75
	E	5.0	6.0
	F	1.4	1.6
	G	0.78	0.86
	H	1.2	1.3
	I	Typ2.54	
	J	8.4	8.6
	K	4.45	4.55
	L	1.25	1.35
	M	0.02	0.1
	N	2.4	2.8
O	0.36	0.40	
All Dimensions in millimeter			

**TO-252**

	Dim.	Min.	Typ.	Max.
	A	2.10	-	2.50
	A2	0	-	0.10
	B	0.66	-	0.86
	B2	5.18	-	5.48
	C	0.40	-	0.60
	C2	0.44	-	0.58
	D	5.90	-	6.30
	D1	5.30REF		
	E	6.40	-	6.80
	E1	4.63	-	-
	G	4.47	-	4.67
	H	9.50	-	10.70
	L	1.09	-	1.21
	L2	1.35	-	1.65
V1	-	7°	-	
V2	0°	-	6°	
All Dimensions in millimeter				

Package Outline Dimensions Millimeters

TO-251

	Dim.	Min.	Max.
	A	2.2	2.4
	A2	0.95	1.15
	A3	0.45	0.65
	b	0.65	0.85
	c	0.45	0.55
	D	6.45	6.75
	D2	5.2	5.4
	E	5.8	6
	E2	0.95	1.25
	e	Typ 2.3	
	e1	Typ 4.6	
	L	4	4.2
	L1	1.2	1.5
All Dimensions in millimeter			

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