

**40V N-CHANNEL ENHANCEMENT MODE MOSFET**

**MAIN CHARACTERISTICS**

$I_D$		60A
$V_{DSS}$		40V
$R_{DS(ON)}$ typ(@ $V_{GS}=10V$ )	TO-252	< 8.5 mΩ (Type: 7.0 mΩ)
	TO-263	< 8.5 mΩ (Type: 7.3 mΩ)
	TO-220AB	< 8.5 mΩ (Type: 7.5 mΩ)

**Features**

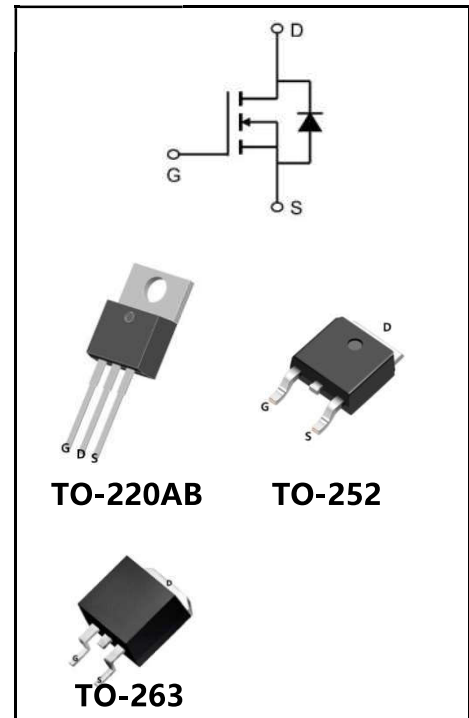
- ◆ Adopt advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.
- ◆ Battery protection
- ◆ Load switch
- ◆ Uninterruptible power supply

**Mechanical Data**

- ◆ Case: Molded plastic
- ◆ Mounting Position: Any
- ◆ Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆ Solder bath temperature 275°C maximum, 10s per JESD22-106

**Product Specification Classification**

Part Number	Part Number	Marking	Pack
YFW60N04AT	TO-220AB	YFW 60N04AT XXXXX	50PCS/Tube
YFW60N04AS	TO-263	YFW 60N04AS XXXXX	50PCS/Tube
YFW60N04AS-R	TO-263	YFW 60N04AS XXXXX	800PCS/Tape
YFW60N04AD	TO-252	YFW 60N04AD XXXXX	2500PCS/Tape



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

Characteristics	Symbols	Value	Units
		252/263/220AB	
Drain-Source Voltage	<b>VDS</b>	40	<b>V</b>
Gate-Source Voltage	<b>VGS</b>	±20	<b>V</b>
Continue Drain Current	<b>ID</b>	60	<b>A</b>
Pulsed Drain Current (Note1)	<b>IDM</b>	125	<b>A</b>
Power Dissipation	<b>PD</b>	39	<b>W</b>
Single Pulse Avalanche Energy (Note1)	<b>EAS</b>	48	<b>mJ</b>
Operating Temperature Range	<b>TJ</b>	150	<b>°C</b>
Storage Temperature Range	<b>TSTG</b>	-55 to +150	<b>°C</b>
Thermal Resistance, Junction to Case	<b>RθJC</b>	3.6	<b>°C/W</b>
Thermal Resistance, Junction to Ambient	<b>RθJA</b>	62	<b>°C/W</b>

Note1:Pulse test: 300 μs pulse width, 2 % duty cycle

**Electrical Characteristics at Tc=25°C unless otherwise specified**

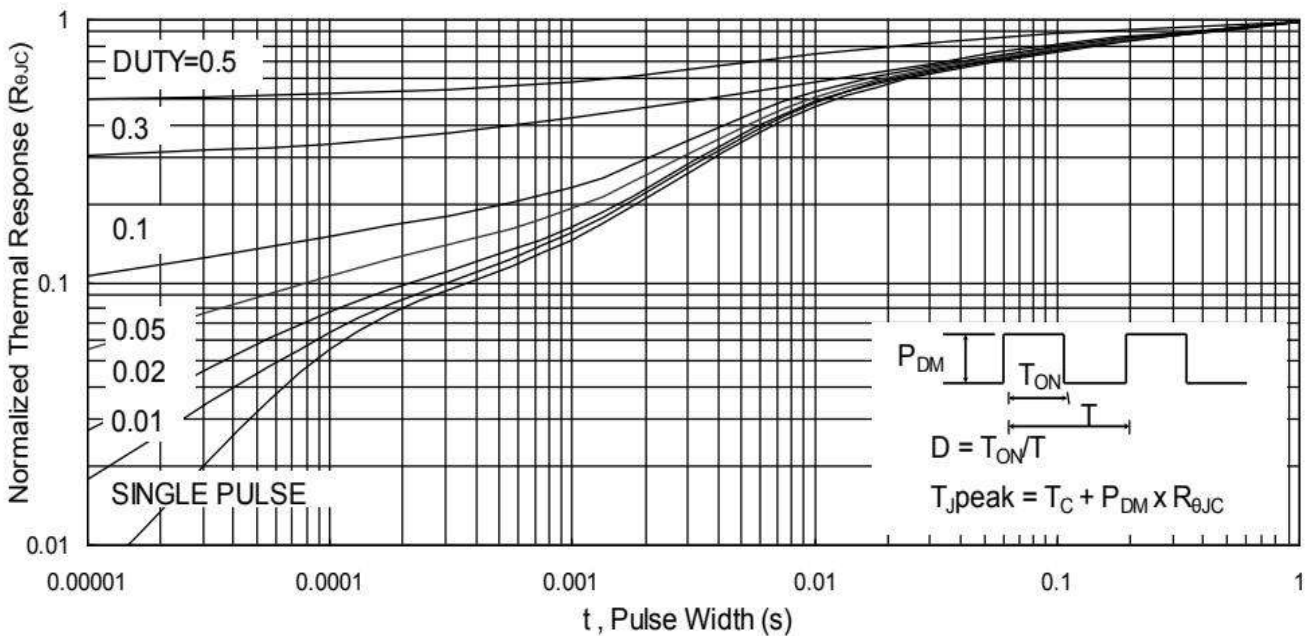
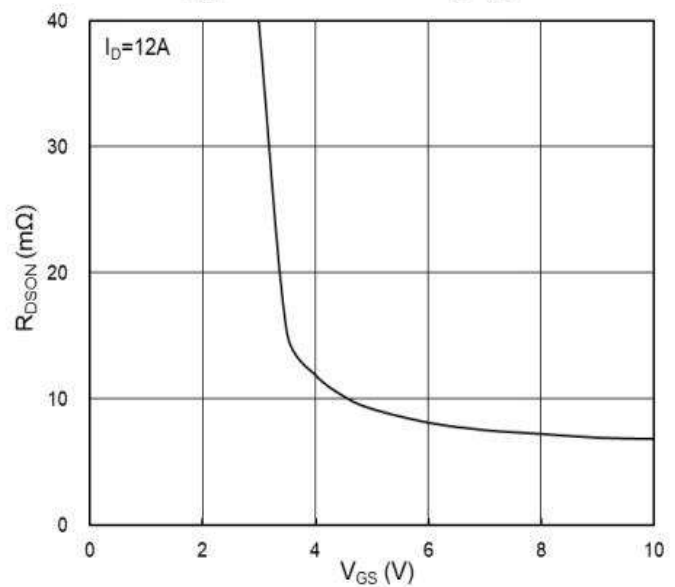
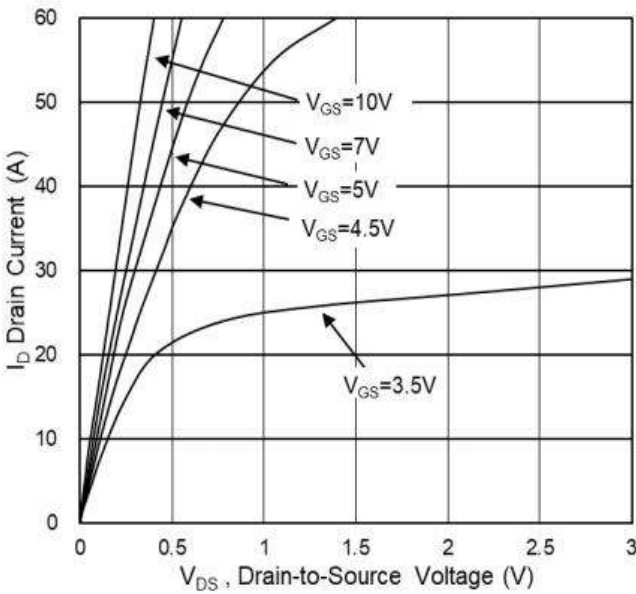
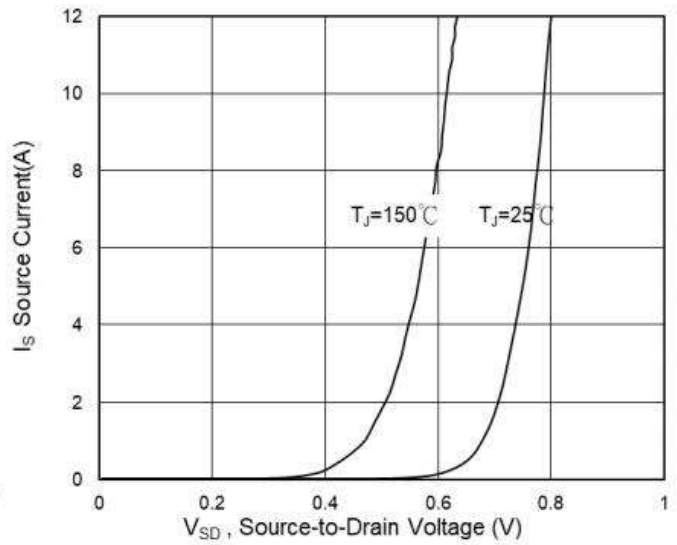
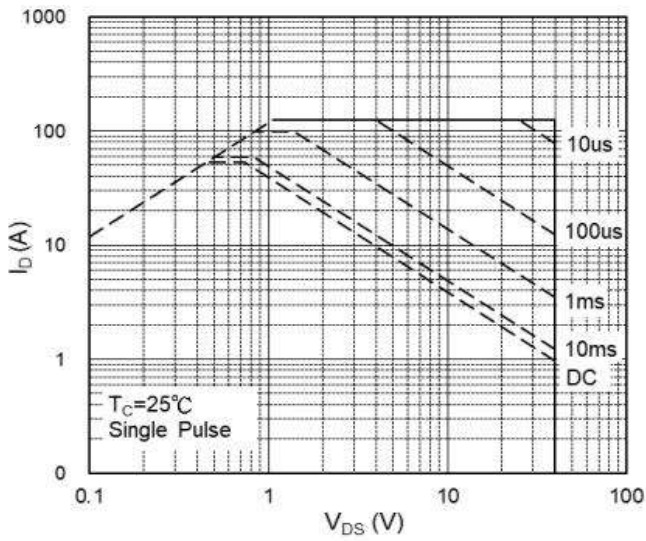
Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0 V, I_D = 250 \mu A$	<b>BV<sub>DSS</sub></b>	40	-	-	<b>V</b>
Drain-Source Leakage Current	$V_{DS} = 40V, V_{GS} = 0 V$	<b>I<sub>DSS</sub></b>	-	-	1	<b>uA</b>
Gate Leakage Current	$V_{GS} = \pm 20 V, V_{DS} = 0 V$	<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>	1	-	2.5	<b>V</b>
Drain-Source On-State Resistance	$V_{GS} = 10 V, I_D = 20 A$	TO-252	-	7.0	8.5	<b>mΩ</b>
		TO-263	-	7.3	8.5	
		TO-220AB	-	7.5	8.5	
Forward Transconductance	$V_{DS} = 5 V, I_D = 30 A$	<b>g<sub>fs</sub></b>	-	36	-	<b>S</b>
Input Capacitance	$V_{GS} = 0 V, V_{DS} = 15 V, f = 1 MHz$	<b>C<sub>iss</sub></b>	-	690	-	<b>pF</b>
Output Capacitance		<b>C<sub>oss</sub></b>	-	182	-	
Reverse Transfer Capacitance		<b>C<sub>rss</sub></b>	-	41	-	
Turn-on Delay Time(Note2)	$I_D = 15 A, V_{DD} = 20 V, R_G = 3.3 \Omega, V_{GS} = 10 V$	<b>t<sub>d(ON)</sub></b>	-	14	-	<b>nS</b>
Rise Time(Note2)		<b>tr</b>	-	5.5	-	
Turn-Off Delay Time(Note2)		<b>t<sub>d(OFF)</sub></b>	-	19	-	
Fall Time(Note2)		<b>tf</b>	-	10.2	-	
Total Gate Charge(Note2)	$I_D = 15 A, V_{DS} = 20 V, V_{GS} = 4.5 V$	<b>Q<sub>G</sub></b>	-	6.2	-	<b>nC</b>
Gate to Source Charge(Note2)		<b>Q<sub>GS</sub></b>	-	3.3	-	
Gate to Drain Charge(Note2)		<b>Q<sub>GD</sub></b>	-	1.5	-	

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

Characteristics	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Maximun Body-Diode Continuous Current		<b>I<sub>S</sub></b>	-	-	60	<b>A</b>
Maximun Body-Diode Pulsed Current(Note2)		<b>I<sub>SM</sub></b>	-	-	125	<b>A</b>
Drain-Source Diode Forward Voltage	$V_{GS} = 0 V, I_S = 1 A, T_J = 25^\circ C$	<b>V<sub>SD</sub></b>	-	0.75	-	<b>V</b>

Note2:Pulse test: 300 μs pulse width, 2 % duty cycle

**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-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	Typ 2.54	
	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			

Package Outline Dimensions Millimeters

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			