

40V N- Channel Advanced Power MOSFET

MAIN CHARACTERISTICS

I_D	160A
V_{DSS}	40V
$R_{DS(on)-typ}(@V_{GS}=10V)$	<2.7m Ω (Typ:2m Ω)

Features

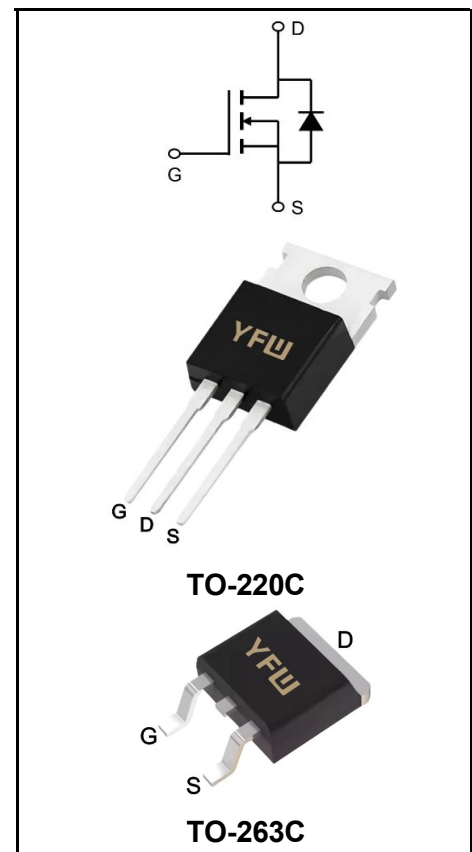
- ◆Advanced Trench Technology
- ◆Provide Excellent $R_{DS(on)}$ and Low Gate Charge
- ◆Lead free product is acquired

Applications

- ◆Load Switch
- ◆PWM Application
- ◆Power management

Mechanical Data

- ◆Case: TO-220C/HAC TO-263C/HASC
- ◆Mounting Position: Any
- ◆Molded Plastic: UL Flammability Classification Rating 94V-0
- ◆Lead free in compliance with EU RoHS 2011/65/EU directive
- ◆Solder bath temperature 275°C maximum, 10s per JESD 22-B106



Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continue Drain Current	I_D	160	A
Pulsed Drain Current (Note1)	I_{DM}	640	A
Power Dissipation	P_D	300	W
Single Pulse Avalanche Energy (Note5)	E_{AS}	630	mJ
Operating Temperature Range	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C
Thermal Resistance, Junction to Case(Note 2)	$R_{\theta JC}$	0.4	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	50	°C/W

Electrical Characteristics at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	BV_{DSS}	40	-	-	V
Drain-Source Leakage Current	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	$V_{GS(th)}$	1.8	-	4	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	$R_{DS(on)}$	-	2	2.7	m Ω
	$V_{GS} = 8\text{ V}, I_D = 20\text{ A}$		-	4	5.5	m Ω
Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}, f = 1\text{ MHz}$	C_{iss}	-	9500	-	pF
Output Capacitance		C_{oss}	-	957	-	pF
Reverse Transfer Capacitance		C_{rss}	-	568	-	pF
Turn-on Delay Time	$V_{DS}=20\text{V}, I_D=30\text{A}$ $V_{GS}=10\text{V}, R_G=2.7\Omega$	$t_{d(ON)}$	-	26	-	ns
Rise Time		t_r	-	30	-	ns
Turn-Off Delay Time		$t_{d(OFF)}$	-	59	-	ns
Fall Time		t_f	-	19	-	ns
Total Gate Charge	$V_{DS}=20\text{V}, I_D=30\text{A}, V_{GS}=10\text{V}$	Q_G	-	145	-	nC
Gate to Source Charge		Q_{GS}	-	50	-	nC
Gate to Drain Charge		Q_{GD}	-	32	-	nC
Maximun Body-Diode Continuous Current (Note 2)		I_S	-	-	160	A
Maximun Body-Diode Pulsed Current		I_{SM}	-	-	640	A
Drain-Source Diode Forward Voltage	$I_{SD} = 30\text{ A}$	V_{SD}	-	-	1.2	V
Reverse Recovery Time	$I_S = I_F, I_{SD}=30\text{A}, V_{GS} = 0\text{ V},$	t_{rr}	-	33	-	ns
Reverse Recovery Charge	$dI / dt = 100\text{ A}/\mu\text{s}$ (Note3)	Q_{rr}	-	29	-	μC

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

RATINGS AND CHARACTERISTIC CURVES

Figure 1: Power De-rating

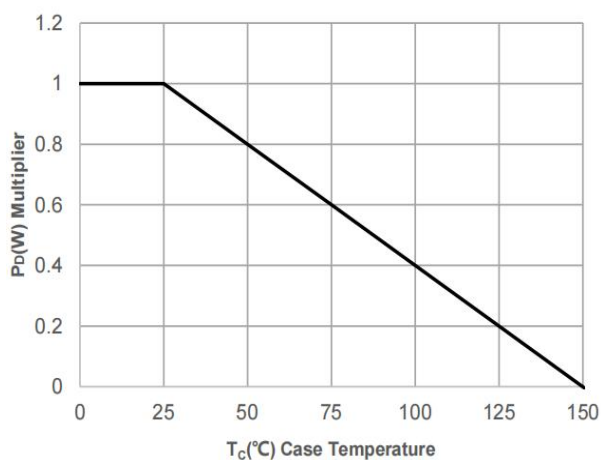


Figure 2: Current De-rating

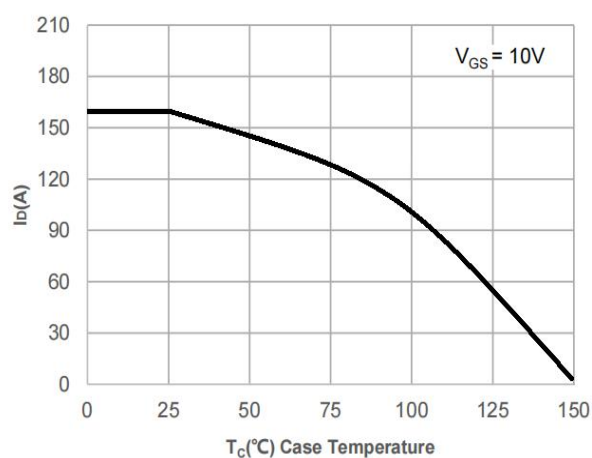


Figure 3: Normalized Maximum Transient Thermal Impedance

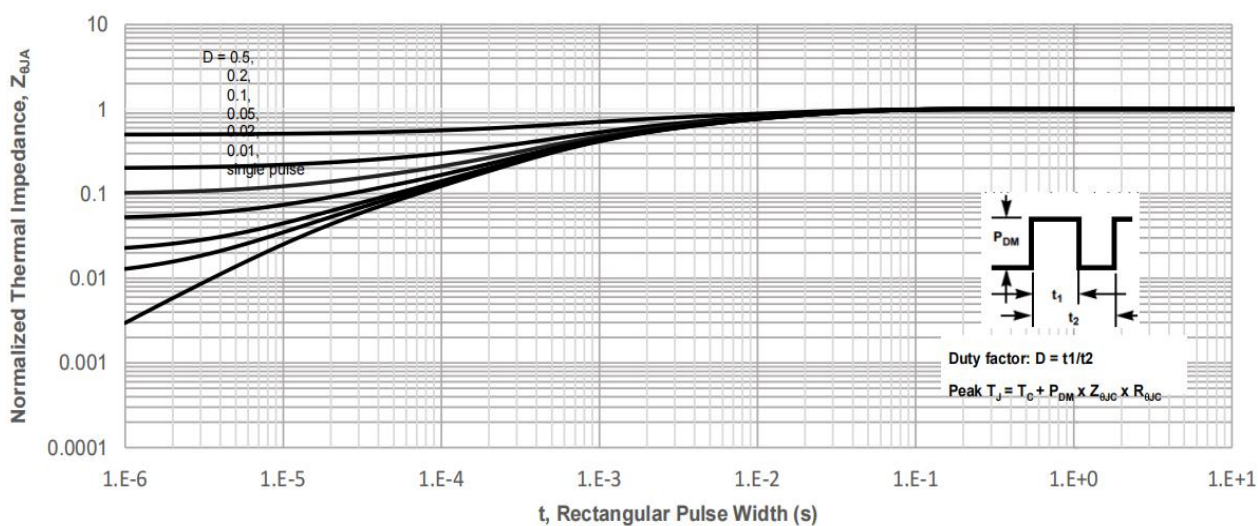
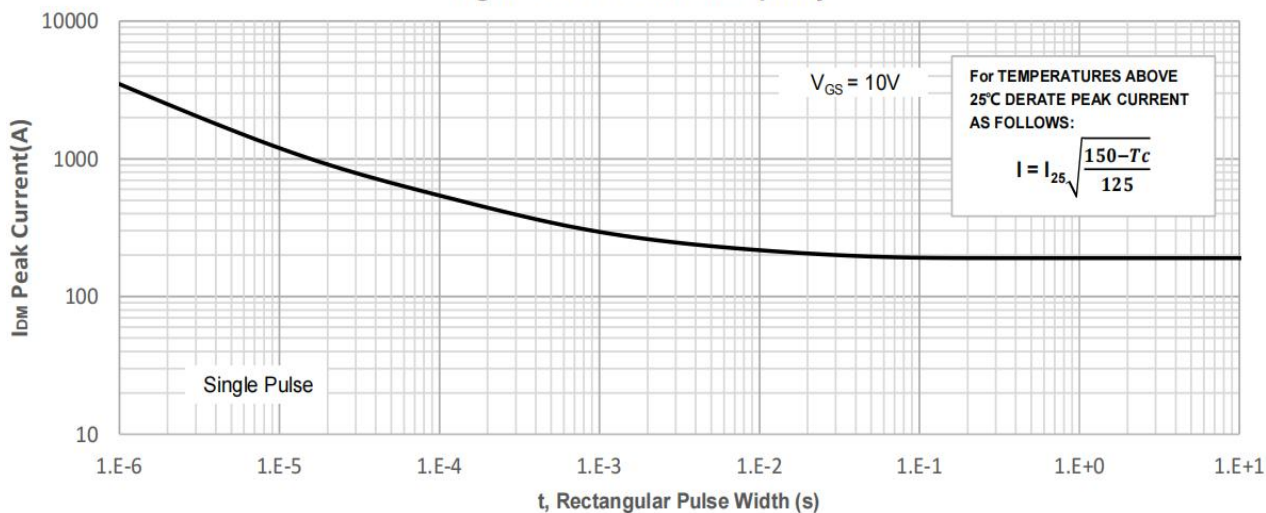


Figure 4: Peak Current Capacity



RATINGS AND CHARACTERISTIC CURVES

Figure 5: Output Characteristics

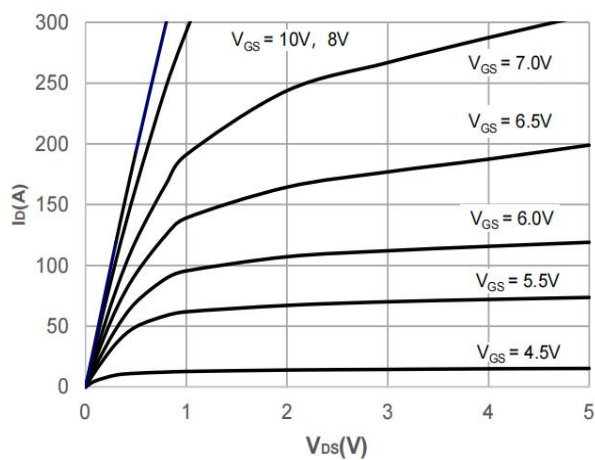


Figure 6: Typical Transfer Characteristics

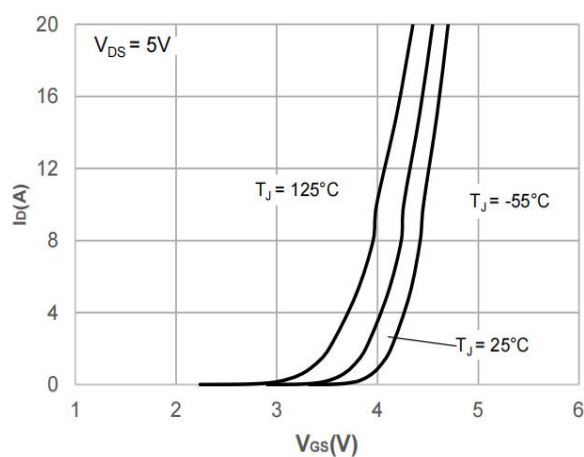


Figure 7: On-resistance vs. Drain Current

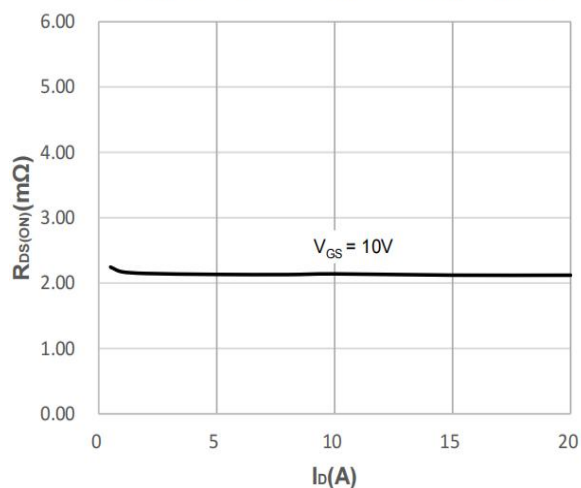


Figure 8: Body Diode Characteristics

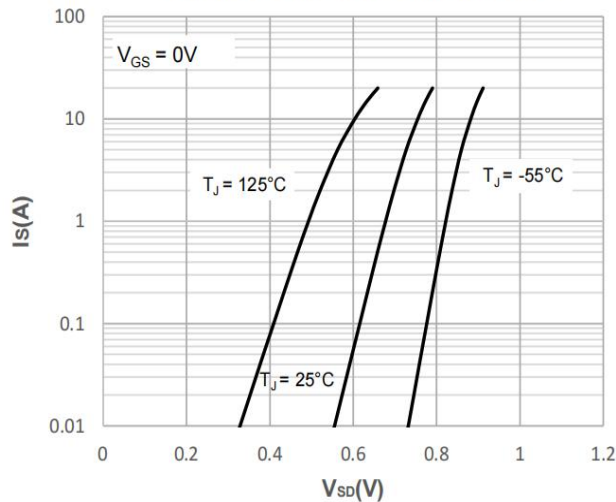


Figure 9: Gate Charge Characteristics

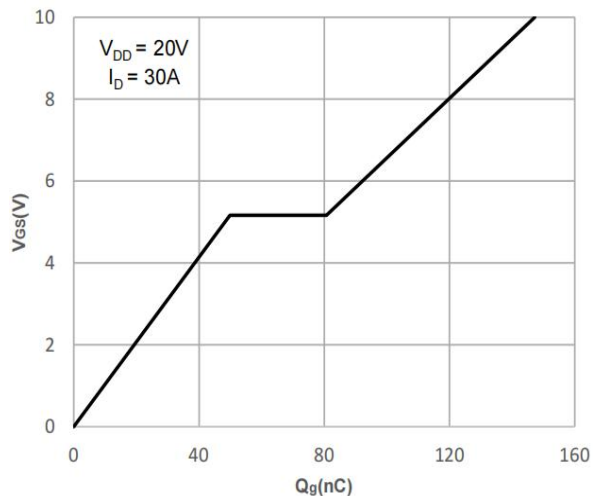
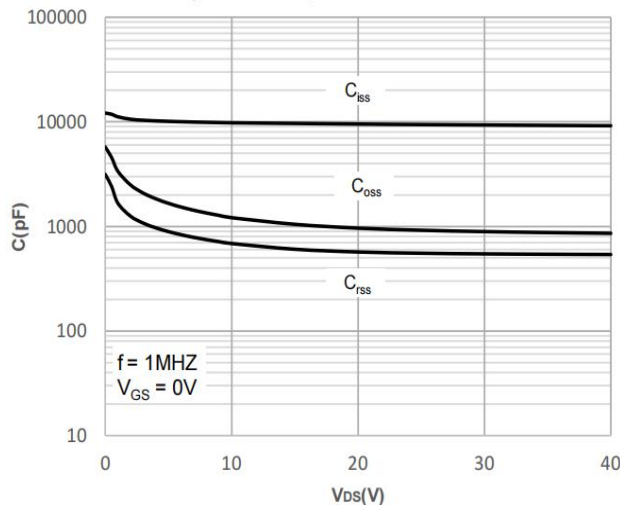
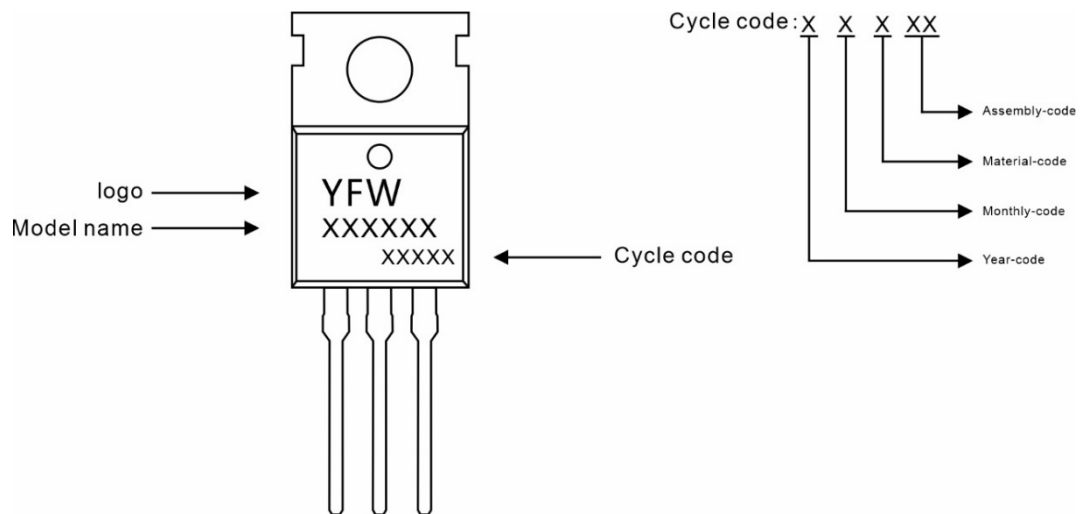


Figure 10: Capacitance Characteristics



Marking Diagram



Ordering information

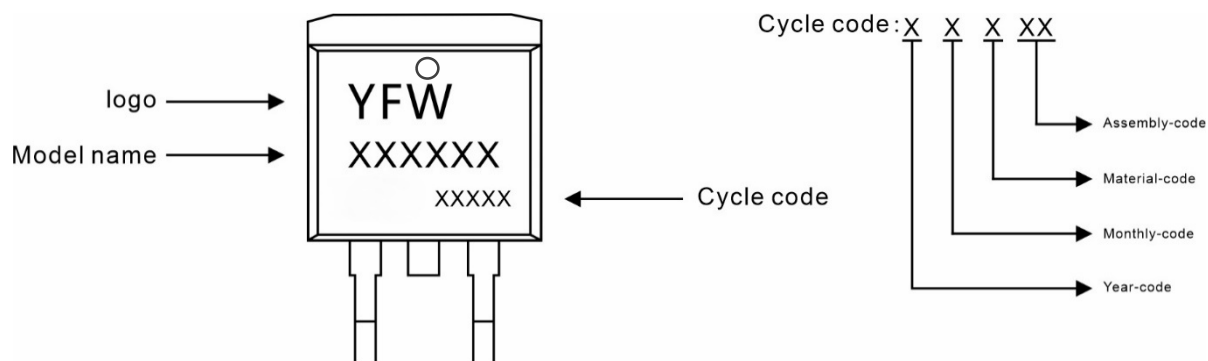
Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW160N04HAC	TO-220C	0.07oz(1.96g)	50pcs/tube	1000PCS/Box 5000PCS/Carton

Package Dimensions

TO-220C

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.34	4.67	0.171	0.184
A1	2.52	2.82	0.099	0.111
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.30	0.50	0.012	0.020
c1	1.17	1.37	0.046	0.054
D	9.90	10.20	0.390	0.402
E	8.50	8.90	0.335	0.350
E1	12.00	12.50	0.472	0.492
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
F	2.60	2.80	0.102	0.110
L	13.20	13.80	0.520	0.543
L1	3.80	4.20	0.150	0.165
Φ	3.60	3.96	0.142	0.156

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW160N04HASC	TO-263C	0.04oz(1.16g)	800pcs/reel	1600pcs/box 8000pcs/Carton

Package Dimensions

TO-263C

Dim	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.70	0.169	0.185
A1	0.00	0.15	0.000	0.006
A2	4.30	4.55	0.169	0.179
B	1.10	1.50	0.043	0.059
b	0.70	0.90	0.028	0.035
b1	1.20	1.50	0.047	0.059
c	0.30	0.60	0.012	0.024
c1	1.17	1.37	0.046	0.054
D	9.90	10.20	0.390	0.402
E	8.50	8.90	0.335	0.350
e	2.44	2.64	0.096	0.104
e1	4.88	5.28	0.192	0.208
L	15.00	15.30	0.591	0.602
L1	5.20	5.40	0.205	0.213
L2	2.40	2.60	0.094	0.102
L3	1.60	1.80	0.063	0.071

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