

650V N-SJ ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

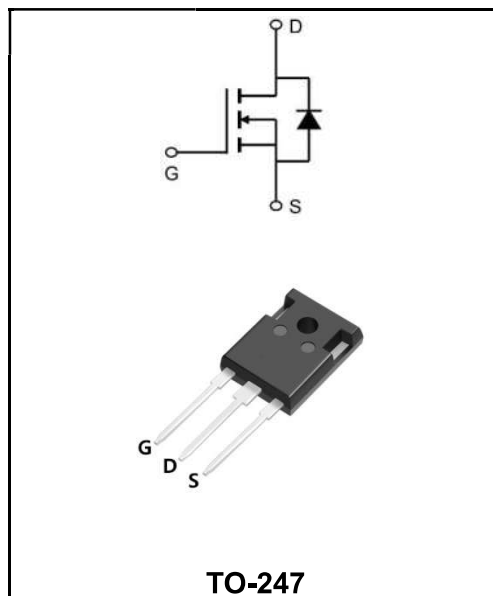
I_D	20A
V_{DSS}	650V
$R_{DS(on)-typ}(@V_{GS}=10V)$	$< 0.2\Omega$ (Type:0.16 Ω)

Features

- ◆Low RDS(on) & FOM
- ◆Extremely low switching loss
- ◆Excellent stability and uniformity
- ◆Easy to drive

Application

- ◆Lighting
- ◆Server power supply
- ◆Telecom
- ◆Solar invertor



Product Specification Classification

Part Number	Package	Marking	Pack
YFWJ20N65AP	TO-247	YFW J20N65AP XXXXX	600PCS/Tube

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbols	Value	Units
Drain-Source Voltage	V_{DS}	650	V
Gate - Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ¹⁾ T _C =25°C	I_D	20	A
Continuous Drain Current ¹⁾ T _C =100°C		12.5	A
Pulsed Drain Current ²⁾ T _C =25°C	$I_{DM} (pulse)$	60	A
Power Dissipation ³⁾ T _C =25°C	P_D	151	W
Single Pulse Avalanche Energy ⁵⁾	E_{AS}	600	mJ
Single pulsed avalanche current ⁵⁾	I_{AS}	10.9	A
Repetitive Avalanche energy	E_{AR}	0.8	mJ
Repetitive Avalanche current	I_{AR}	10.9	A
MOSFET dv/dt ruggedness, V _{DS} =0...480 V	dv/dt	50	V/ns
Reverse diode dv/dt, V _{DS} =0...480 V, I _{SD} ≤I _D	dv/dt	15	V/ns
Operating and Storage Temperature	T _J , T _{STG}	-55 to 150	°C
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.82	°C/W
Thermal Resistance, Junction-to-ambient ⁴⁾	$R_{\theta JA}$	62	°C/W

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	650	-	-	V
	$V_{GS}=0V, I_D=250\mu A, T_J=150^\circ C$		700	774		
Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	$V_{GS(th)}$	2.0	-	4	V
Drain-Source On-State Resistance	$V_{GS}=10V, I_D=10A$	$R_{DS(on)}$	-	0.16	0.2	Ω
	$V_{GS}=10V, I_D=10A, T_J=150^\circ C$		-	0.42	-	
Gate Source Leakage Current	$V_{GS}=30V$	I_{GSS}	-	-	100	nA
	$V_{GS}=-30V$		-	-	-100	
Drain-source leakage current	$V_{DS}=650V, V_{GS}=0V$	I_{DSS}	-	-	1	μA
Input Capacitance	$V_{DS}=50V$ $V_{GS}=0V$ $f=1MHz$	C_{iss}	-	1433	-	pF
Output Capacitance		C_{oss}	-	925	-	
Reverse Transfer Capacitance		C_{rss}	-	3.9	-	
Turn-on delay time	$V_{DS}=520V$ $I_D=20A$ $R_G=25\Omega$ $V_{GS}=10V$	$t_{d(on)}$	-	40.1	-	ns
Rise Time		T_r	-	49.8	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	57.3	-	
Fall Time		t_f	-	63.7	-	
Total Gate Charge	$V_{DS}=520V$ $I_D=20A$ $V_{GS}=10V$	Q_g	-	24.8	-	nC
Gate-Source Charge		Q_{gs}	-	7.2	-	
Gate-Drain Charge		Q_{gd}	-	8.2	-	
Gate plateau voltage		$V_{plateau}$	-	5.6	-	V
Diode forward current	$V_{GS}<V_{th}$	I_S	-	-	20	A
Pulsed source current		I_{SP}	-	-	60	
Diode forward voltage	$V_{GS}=0V, I_S=20A$	V_{SD}	-	-	1.4	V
Reverse Recovery Time	$I_S=20A, V_R=400V$ $di_{SD}/dt=100A/\mu s,$	t_{rr}	-	380	-	ns
Reverse Recovery Charge		Q_{rr}	-	5.3	-	nC
Peak reverse recovery current		I_{rrm}	-	25.7	-	A

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of R θ JA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 °C.
- 5) VDD=150 V, RG=25 Ω , L=10.8 mH, starting TJ=25 °C.

Ratings and Characteristic Curves

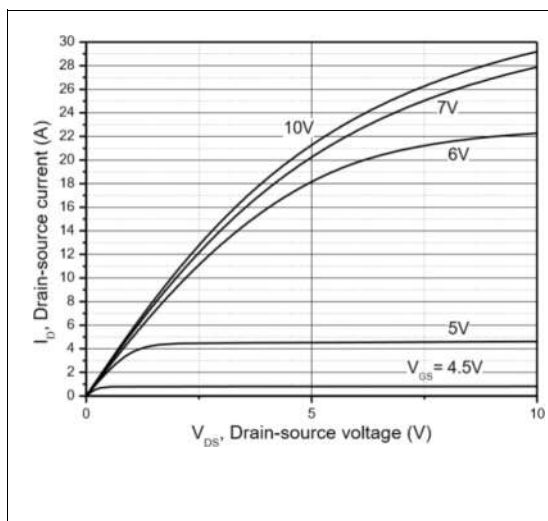


Figure 1, Typ. output characteristics

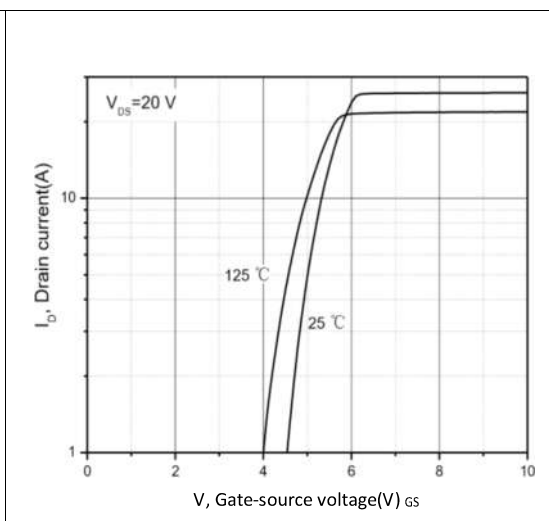


Figure 2, Typ. transfer characteristics

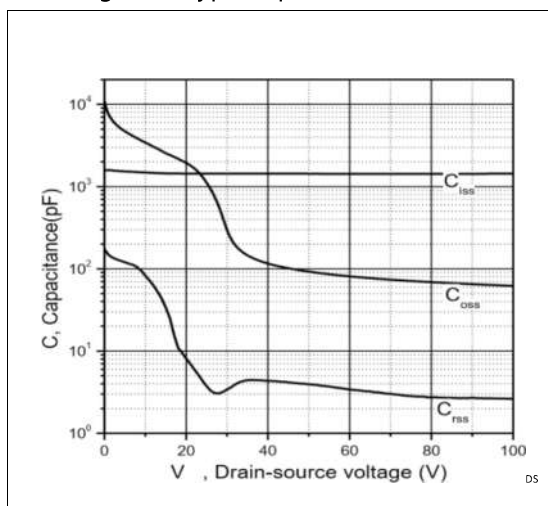


Figure 3, Typ. capacitances

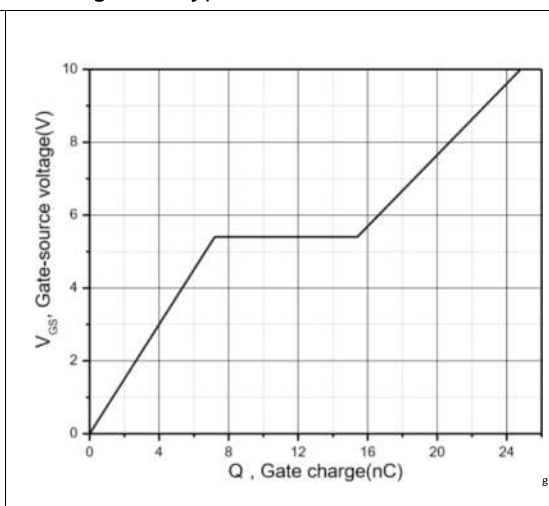


Figure 4, Typ. gate charge

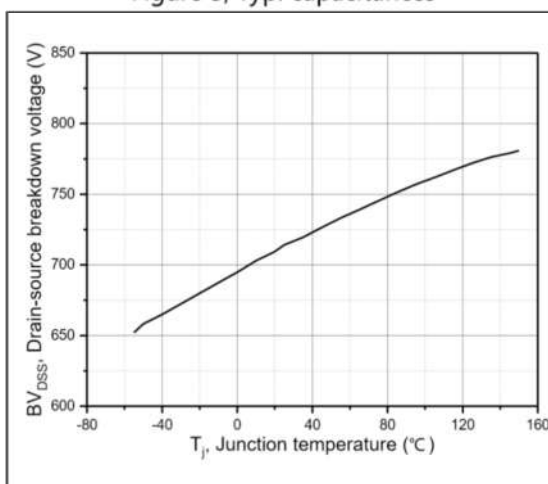


Figure 5, Drain-source breakdown voltage

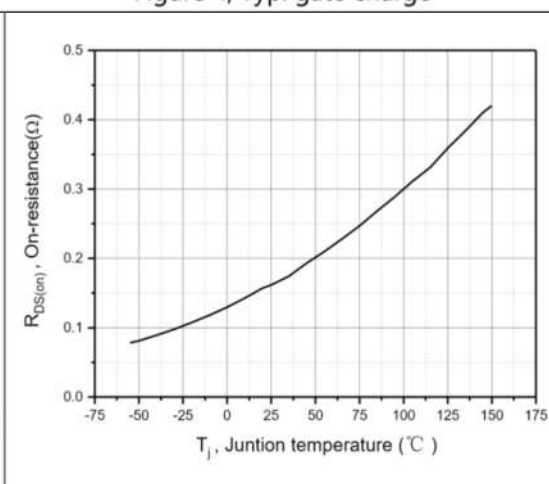


Figure 6, Drain-source on-state resistance

Ratings and Characteristic Curves

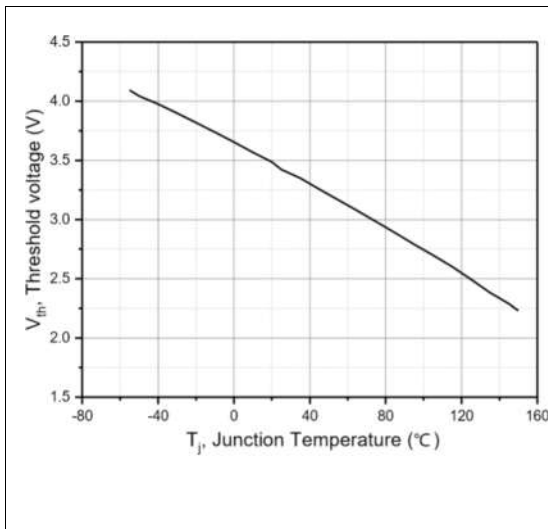


Figure 7, Threshold voltage

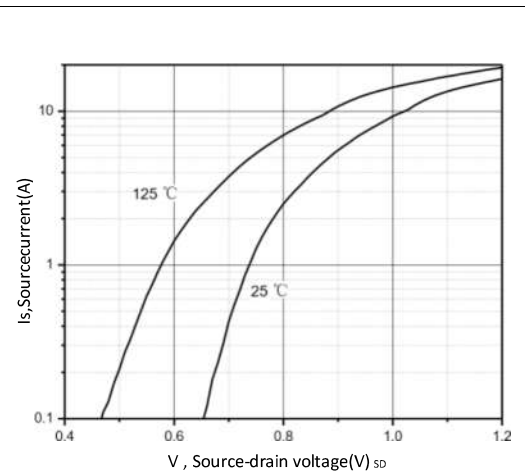


Figure 8, Forward characteristic of body diode

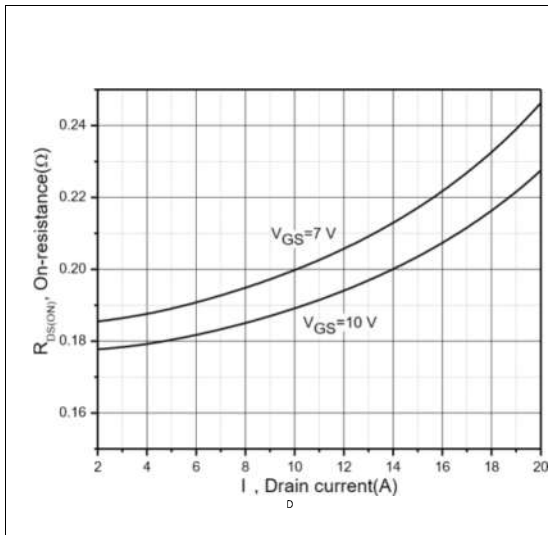


Figure 9, Drain-source on-state resistance

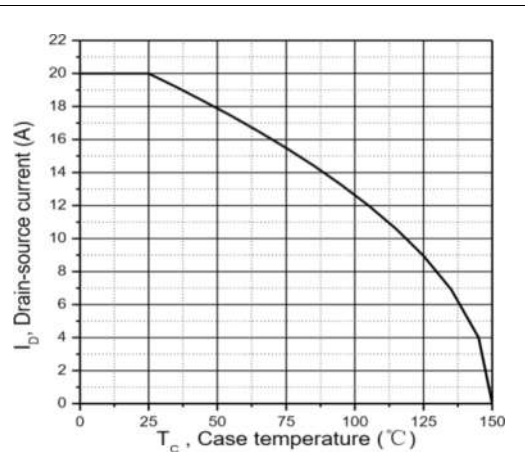


Figure 10, Drain current

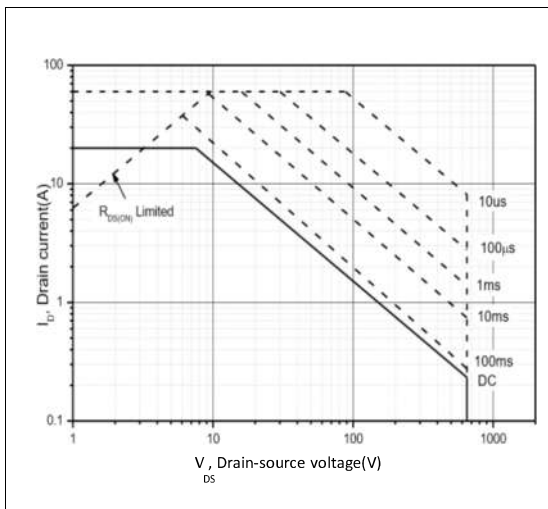


Figure 11, Safe operation area for

Ratings and Characteristic Curves

Test circuits and waveforms

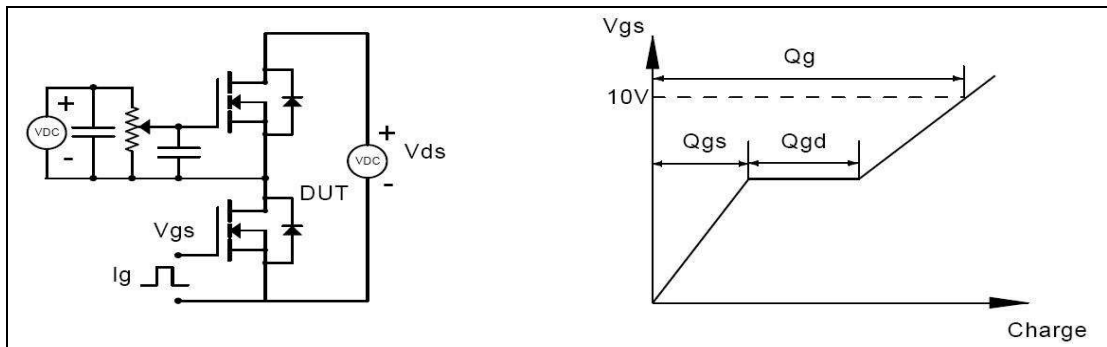


Figure 1, Gate charge test circuit & waveform

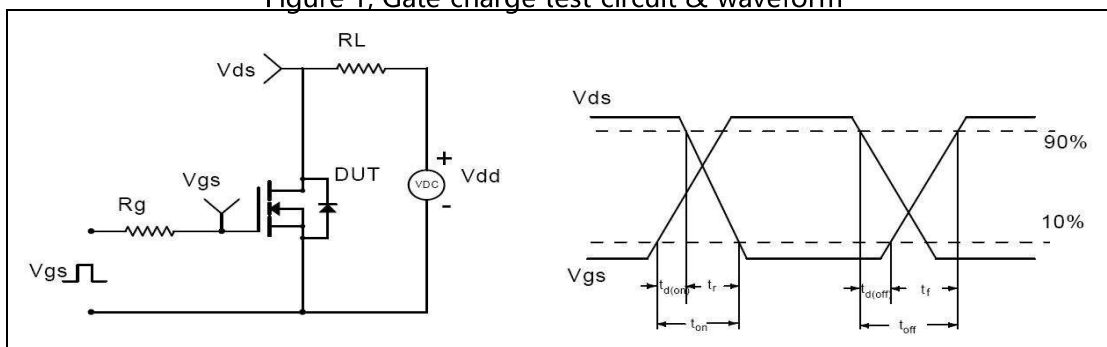


Figure 2, Switching time test circuit & waveforms

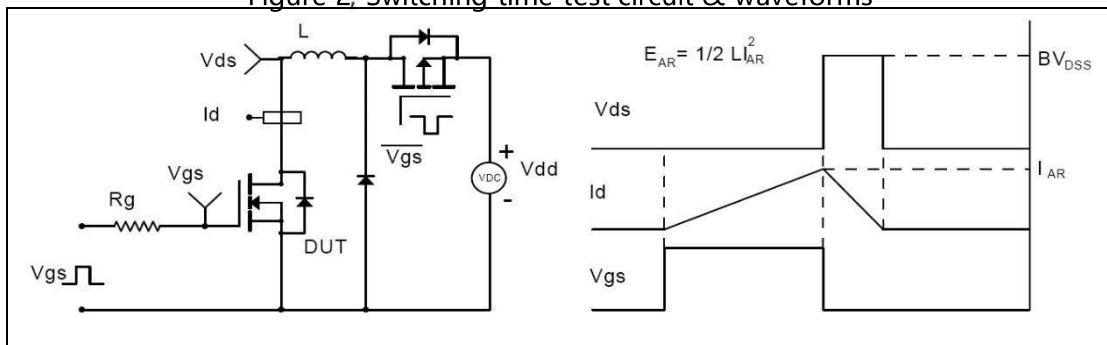


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

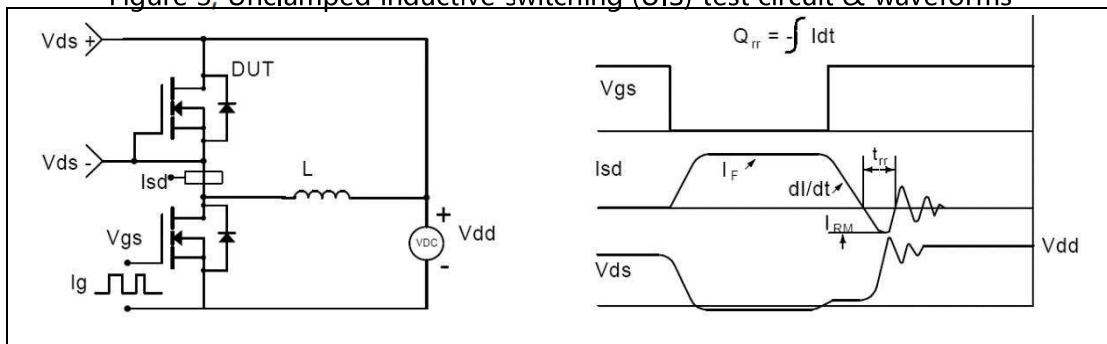
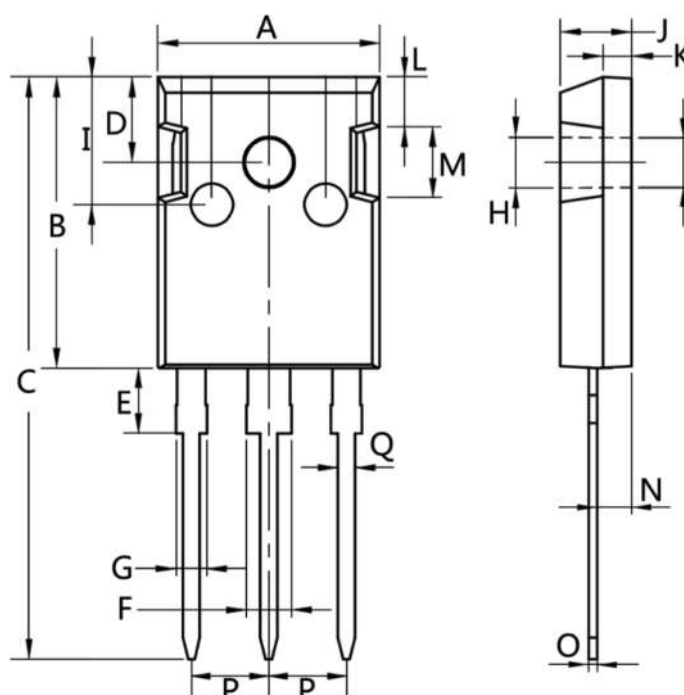


Figure 4, Diode reverse recovery test circuit & waveforms

TO-247



Dim.	Min.	Max.
A	15.0	16.0
B	20.0	21.0
C	41.0	42.0
D	5.0	6.0
E	4.0	5.0
F	2.5	3.5
G	1.75	2.5
H	3.0	3.5
I	8.0	10.0
J	4.9	5.1
K	1.9	2.1
L	3.5	4.0
M	4.75	5.25
N	2.0	3.0
O	0.55	0.75
P	Typ 5.08	
Q	1.2	1.3