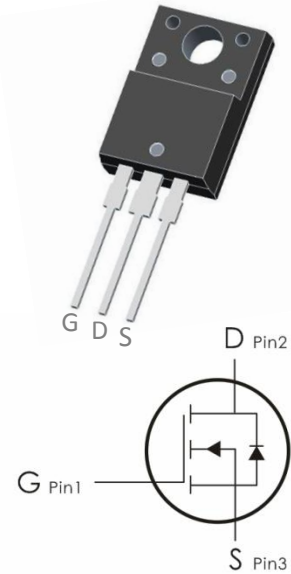


Description:

This N-Channel MOSFET uses advanced Planar technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety of applications.

Features:

- 1) $V_{DS}=600V, I_D=12A, R_{DS(ON)} < 600m\ \Omega @ V_{GS}=10V$ (Typ: $550m\ \Omega$)
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density Planar technology for ultra low $R_{DS(ON)}$.
- 5) Excellent package for good heat dissipation.



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
FN12NG-S	N12N-S	TO- 220F	50 pcs/Tube

Absolute Maximum Ratings: ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current ¹	12	A
	Continuous Drain Current- $T_C=100^\circ C$ ¹	8.4	
I_{DM}	Pulsed Drain Current ²	48	
P_D	Power Dissipation	70	W
E_{AS}	Single pulse avalanche energy ³	870	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+150	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.27	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	$^\circ C/W$

Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	600	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=600V$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Drain-Source On Resistance ⁴	$V_{GS}=10V, I_D=10A$	---	550	600	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	1920	---	pF
C_{oss}	Output Capacitance		---	174.3	--	
C_{rss}	Reverse Transfer Capacitance		---	18.9	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=300V, I_D=12A,$ $R_{ENG}=25\ \Omega, V_{GS}=10V$	---	31.5	---	ns
t_r	Rise Time		---	84	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	151.2	---	ns
t_f	Fall Time		---	80.8	---	ns
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DS}=480V,$ $I_D=12A$	---	44	---	nC
Q_{gs}	Gate-Source Charge		---	7	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	19.4	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_{SD}=12A$	---	---	1.4	V
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	---	8.5	A
I_{SM}	Pulsed Drain Current		---	---	34.2	A
T_{rr}	Reverse Recovery Time	$I_F=12A, T_J=25^\circ\text{C}$	---	380	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu\text{s}$	---	3.5	---	nC

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : $T_J=25^{\circ}C, V_{DD}=300V, V_G=10V, L=0.5mH$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics: ($T_C=25^{\circ}C$ unless otherwise noted)

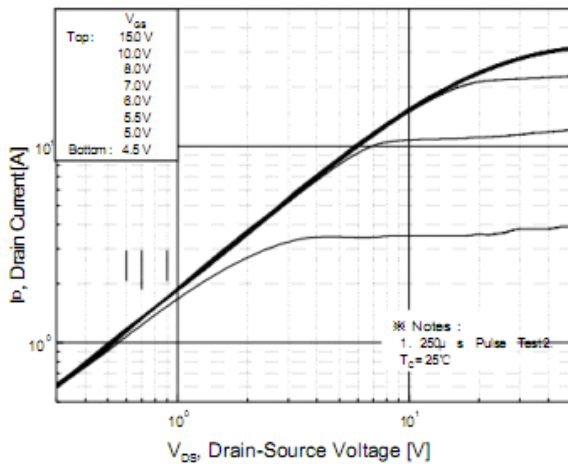


Figure 1. On-Region Characteristics

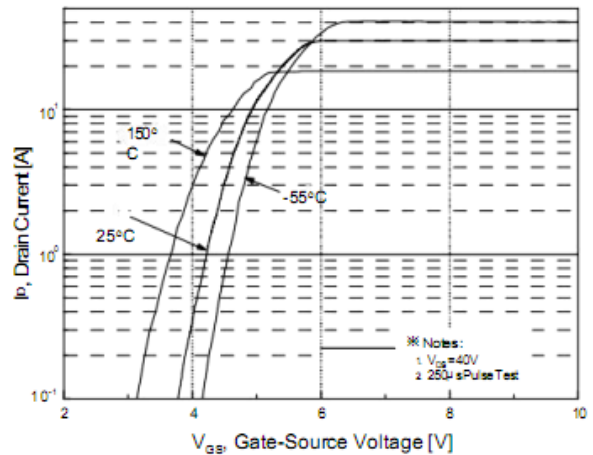


Figure 2. Transfer Characteristics

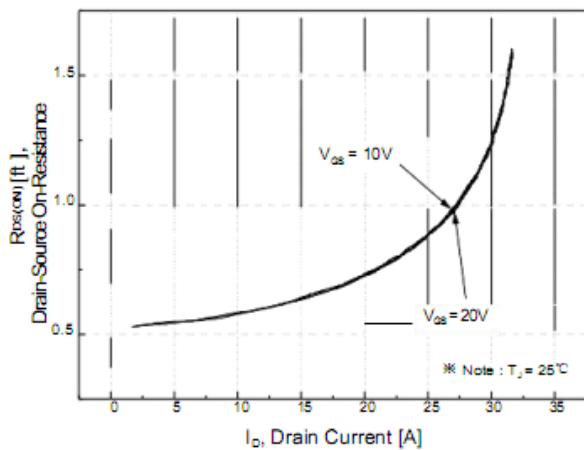


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

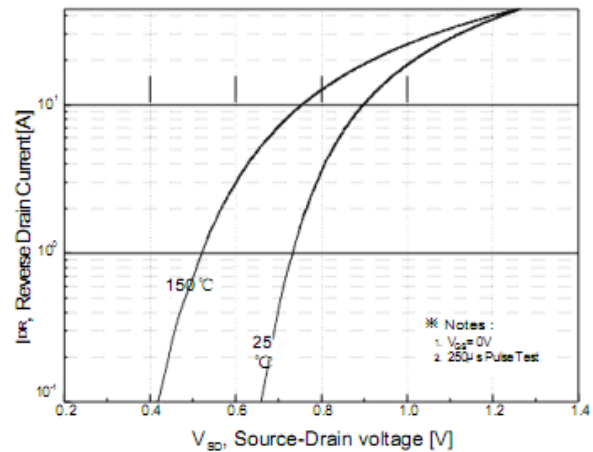


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

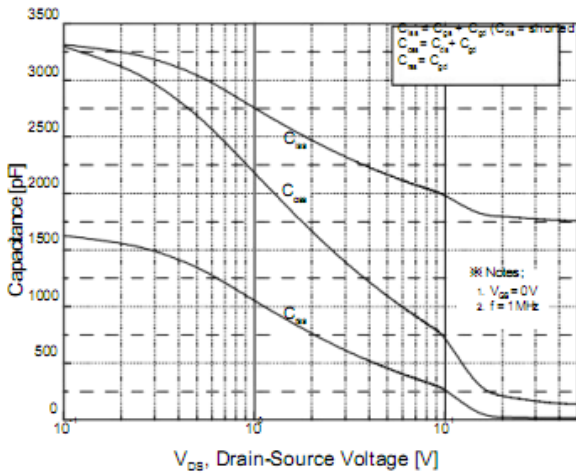


Figure 5. Capacitance Characteristics

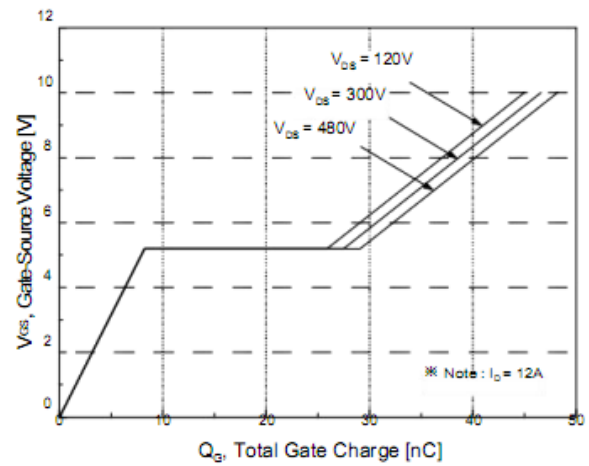


Figure 6. Gate Charge Characteristics

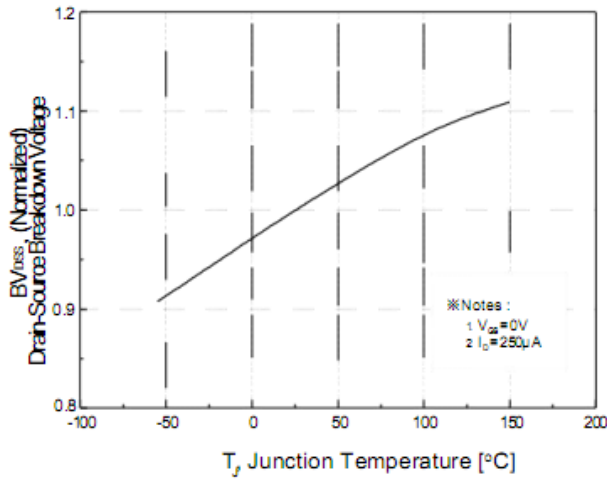


Figure 7. Breakdown Voltage Variation vs Temperature

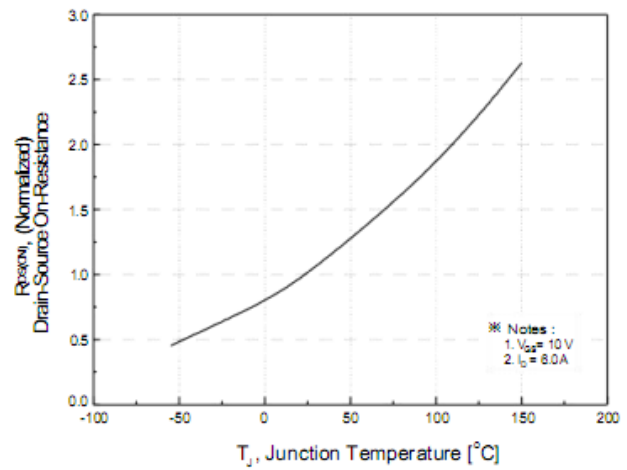


Figure 8. On-Resistance Variation vs Temperature

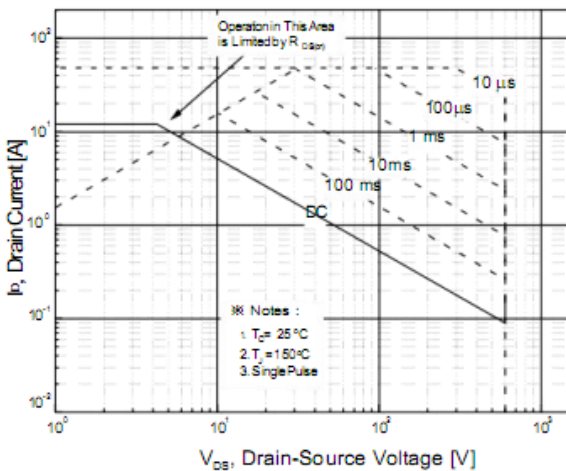


Figure 9-2. Maximum Safe Operating Area

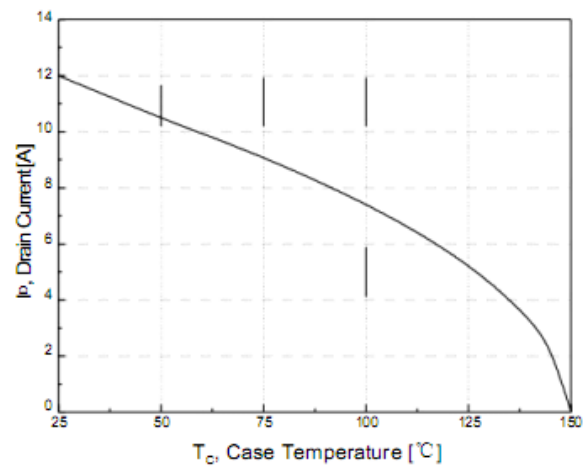


Figure 10. Maximum Drain Current vs Case Temperature

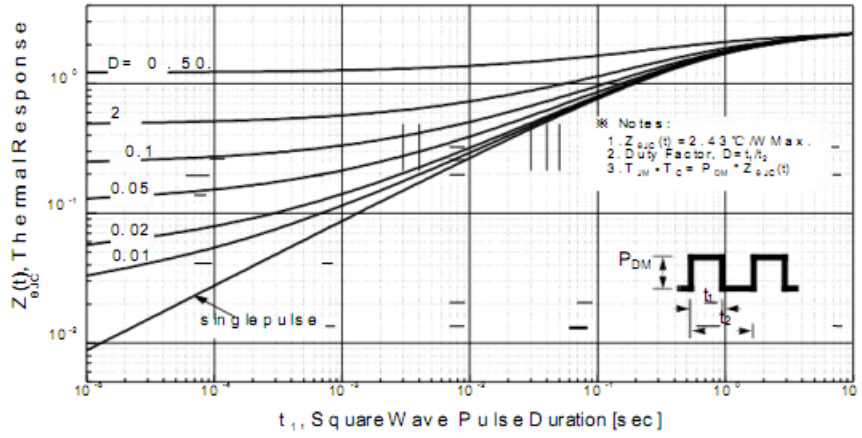
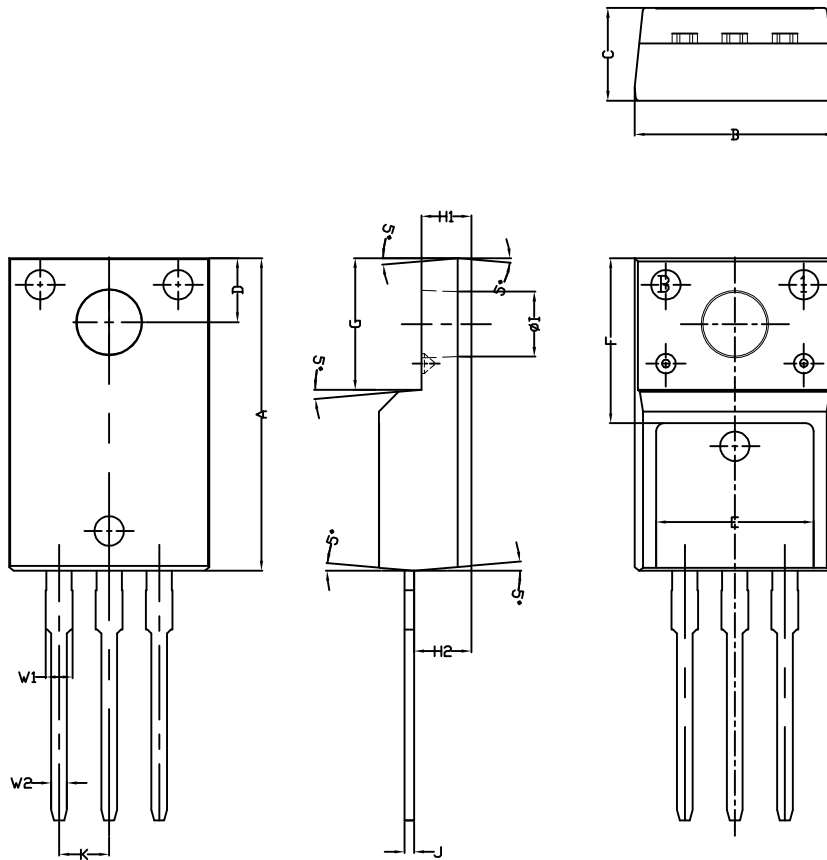


Figure 11-2. Transient Thermal Response Curve

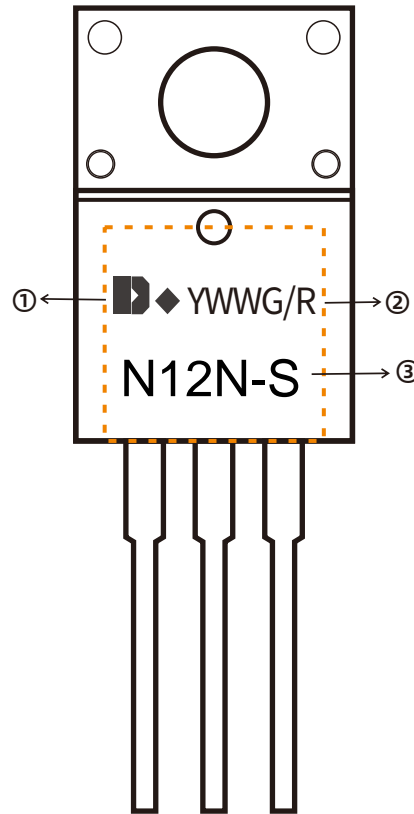
TO-220F Package Information:



Symbol	MM			Inch		
	Min	Mim	Max	Min	Mim	Max
A	15.67	15.87	16.07	0.6169	0.6248	0.6328
B	9.86	10.16	10.46	0.3882	0.4000	0.4118
C	4.50	4.70	4.90	0.1772	0.1850	0.1929
D	3.15	3.35	3.55	0.1240	0.1319	0.1398
E	7.80	8.00	8.20	0.3071	0.3150	0.3228
F	8.18	8.38	8.58	0.3220	0.3299	0.3378
H1	2.34	2.54	2.84	0.0921	0.1000	0.1118
H2	2.40	2.90	3.40	0.0945	0.1141	0.1339
I	3.10	3.30	3.50	0.1220	0.1299	0.1378
W1	1.08	1.28	1.48	0.0425	0.0504	0.0583
W2	0.70	0.80	0.90	0.0276	0.0315	0.0354
K	2.44	2.54	2.64	0.0961	0.1000	0.1039
G	6.48	6.68	6.88	0.2551	0.2630	0.2709
J	0.45	0.50	0.6	0.0177	0.0197	0.0236

Marking Information:

- ①. Doingter LOGO
- ②. Date Code(YWWG / R)
 - Y : Year Code , last digit of the year
 - WW : Week Code(01-53)
 - G/R : G(Green) /R(Lead Free)
- ③. Part NO.



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2026-02-07	Release of final version

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