GOODWORK

13N50F
13A N-Channel Power MOSFET

Features

- 100% UIS and R_g tested
- Advanced planar process
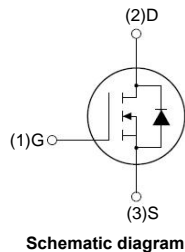
Application

- Power Supply
- AC/DC LED Lighting

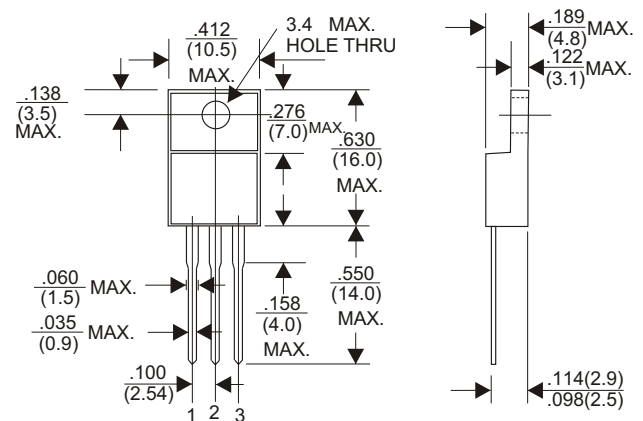## Mechanical Data

Case : Molded plastic body

Terminals : Solder plated, solderable per MIL-STD-750, Method 2026

Polarity : As marked

Mounting Position : Any

ITO-220AB(FULLYINSULATED)

Dimensions in inches and (millimeters)

Schematic diagram

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

PARAMETER		SYMBOL	Limit	UNIT
Drain-Source Voltage		V_{DS}	500	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current [Note 1]	T_C = 25°C	I_D	13	A
	T_C = 100°C		8	
Pulsed Drain Current [Note 2]		I_{DM}	52	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	57	W
Single Pulse Avalanche Energy [Note 3]		E_{AS}	608	mJ
Single Pulse Avalanche Current [Note 3]		I_{AS}	7.8	A
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	Limit	UNIT
Junction to Case Thermal Resistance	$R_{\Theta JC}$	2.2	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	62	°C/W

Thermal Performance Note: $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. $R_{\Theta JA}$ is guaranteed by design while $R_{\Theta CA}$ is determined by the user's board design.

13N50F

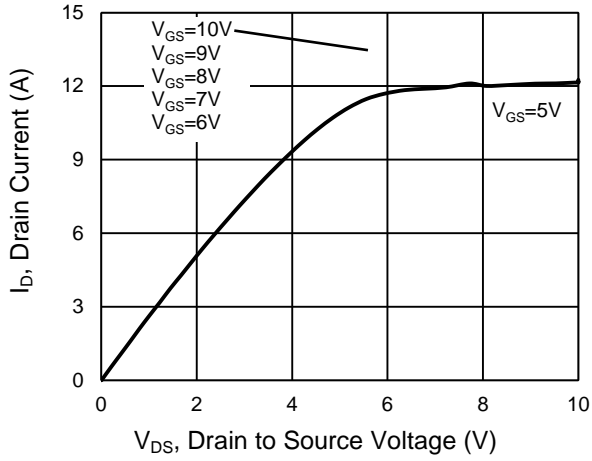## ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)

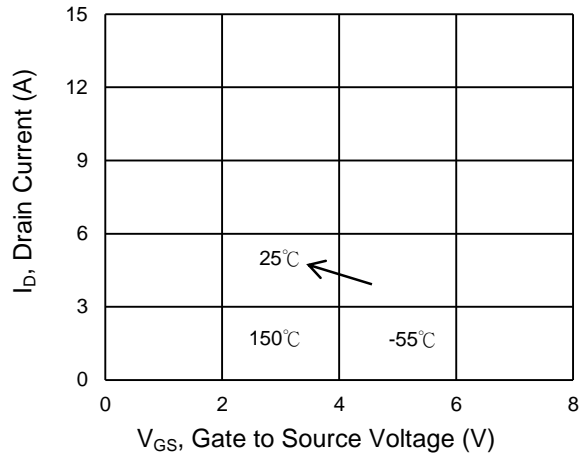| PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250µA	BV_{DSS}	500	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	$V_{GS(TH)}$	2.5	3	3.8	V
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 500V, V_{GS} = 0V	I_{DSS}	--	--	1	µA
Drain-Source On-State Resistance (Note 4)	V_{GS} = 10V, I_D = 3.3A	$R_{DS(on)}$	--	0.37	0.48	Ω
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 400V, I_D = 6.5A, V_{GS} = 10V	Q_g	--	39	--	nC
Gate-Source Charge		Q_{gs}	--	10	--	nC
Gate-Drain Charge		Q_{gd}	--	12	--	nC
Input Capacitance	V_{DS} = 50V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	1877	--	pF
Output Capacitance		C_{oss}	--	128	--	pF
Reverse Transfer Capacitance		C_{rss}	--	7	--	pF
Gate Resistance		R_g	--	1.1	2.2	Ω
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 250V, R_G = 5Ω, I_D = 6.5A, V_{GS} = 10V	$t_{d(on)}$	--	11	--	ns
Turn-On Rise Time		t_r	--	21	--	ns
Turn-Off Delay Time		$t_{d(off)}$	--	32	--	ns
Turn-Off Fall Time		t_f	--	22	--	ns
Source-Drain Diode						
Body-Diode Continuous Forward Current		I_S	--	--	13	A
Body-Diode Pulsed Current		I_{SM}	--	--	52	A
Forward Voltage (Note 4)	I_S = 6.5A, V_{GS} = 0V	V_{SD}	--	--	1.2	V
Reverse Recovery Time	I_S = 6.5A	t_{rr}	--	282	--	ns
Reverse Recovery Charge	dI_F/dt = 100A/µs	Q_{rr}	--	2.9	--	µC

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 20mH, I_{AS} = 7.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. Pulse test: PW ≤ 300µs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.
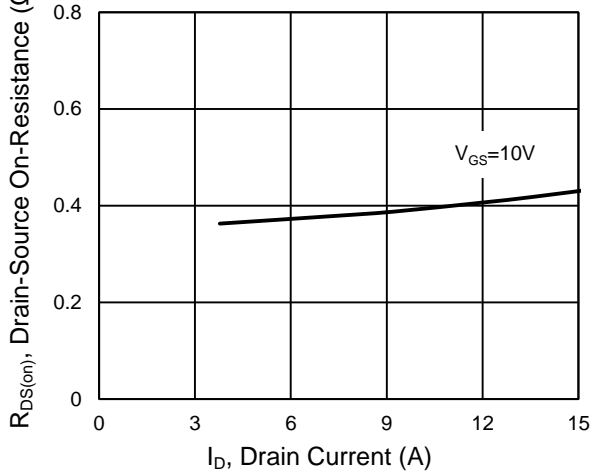
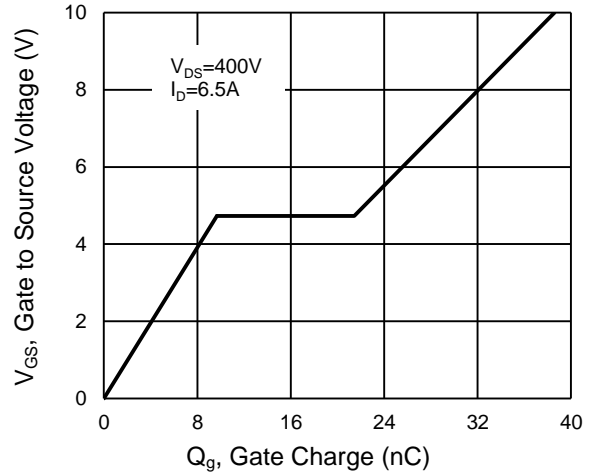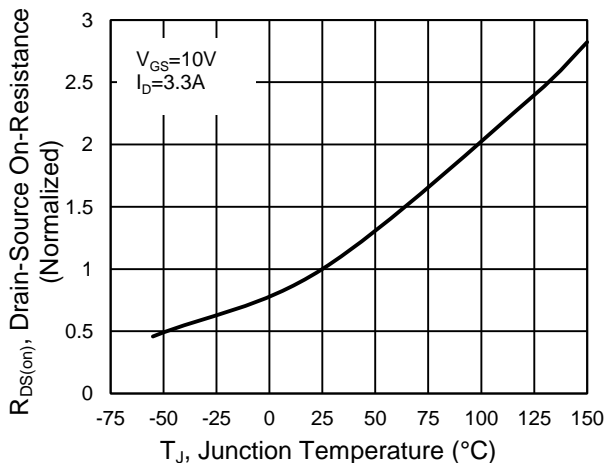# RATING AND CHARACTERISTIC CURVES (13N50F)

Output Characteristics

V_{GS}=10V
V_{GS}=9V
V_{GS}=8V
V_{GS}=7V
V_{GS}=6V

V_{GS}=5V

I_D, Drain Current (A) vs. V_{DS}, Drain to Source Voltage (V)

Transfer Characteristics

25℃

150℃   -55℃

I_D, Drain Current (A) vs. V_{GS}, Gate to Source Voltage (V)

On-Resistance vs. Drain Current

V_{GS}=10V

$R_{DS(on)}$, Drain-Source On-Resistance (Ω) vs. I_D, Drain Current (A)

Gate-Source Voltage vs. Gate Charge

V_{DS}=400V
I_D=6.5A

V_{GS}, Gate to Source Voltage (V) vs. Q_g, Gate Charge (nC)

On-Resistance vs. Junction Temperature

V_{GS}=10V
I_D=3.3A

$R_{DS(on)}$, Drain-Source On-Resistance (Normalized) vs. T_J, Junction Temperature (°C)

On-Resistance vs. Gate-Source Voltage

I_D=3.3A

$R_{DS(on)}$, Drain-Source On-Resistance (Ω) vs. V_{GS}, Gate to Source Voltage (V)
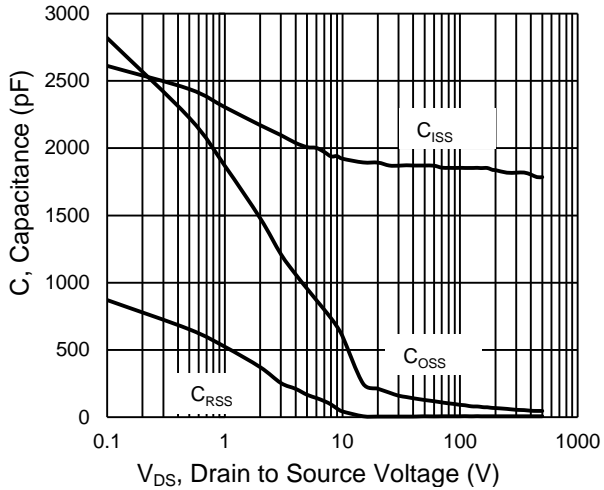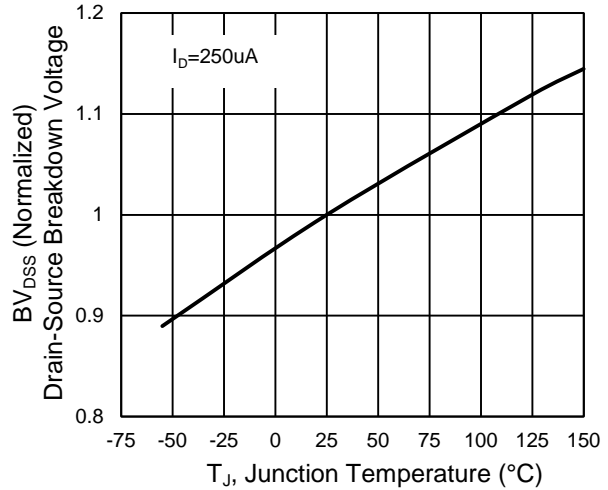
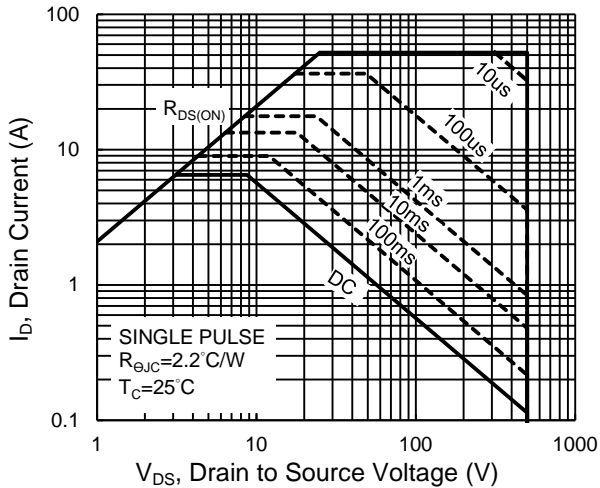# RATING AND CHARACTERISTIC CURVES (13N50F)

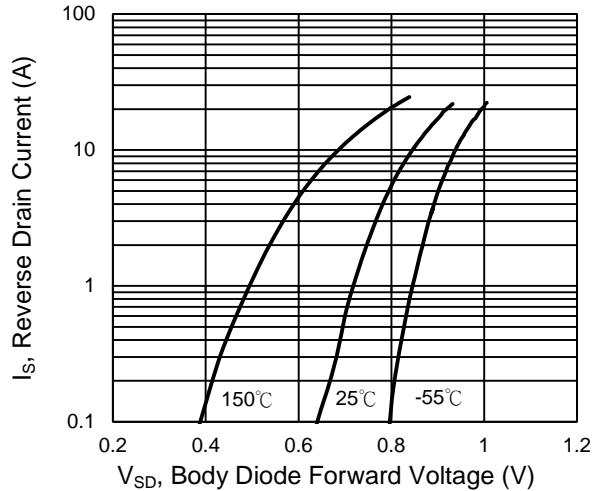## Capacitance vs. Drain-Source Voltage
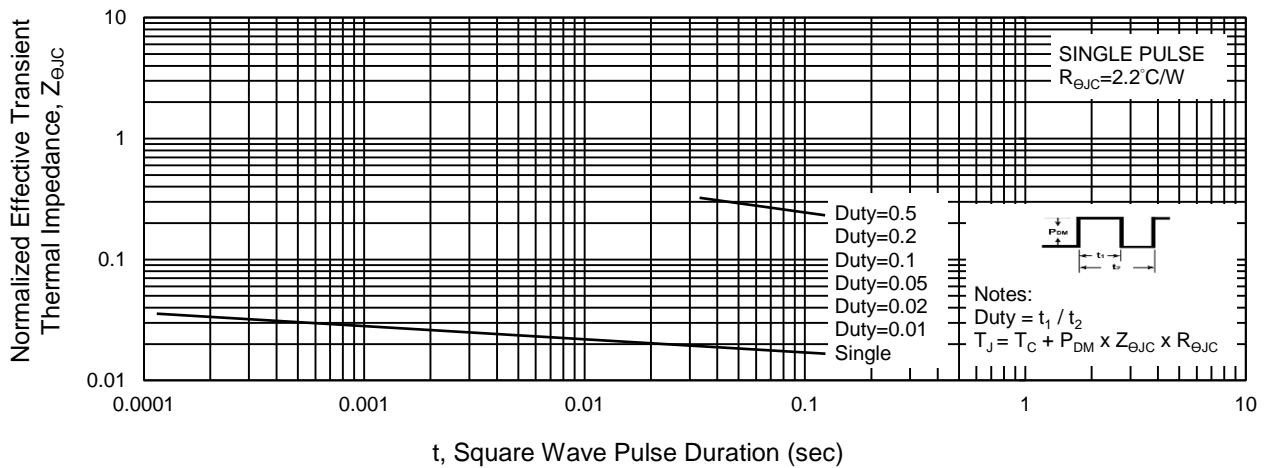

BV$_{DSS}$ vs. Junction Temperature

Maximum Safe Operating Area, Junction-to-Case

Source-Drain Diode Forward Current vs. Voltage

Normalized Thermal Transient Impedance, Junction-to-Case

Notes:
Duty = t_1 / t_2
$T_J = T_C + P_{DM} \times Z_{\theta JC} \times R_{\theta JC}$

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