13N50F

N-Channel Enhancement Mode MOSFET

V_{DSS}	500 V
I_D	13 A
$R_{DS(ON)}$	0.37 Ω

FEATURES

- 100% UIS and R_g tested
- Advanced planar process

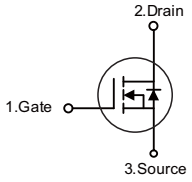


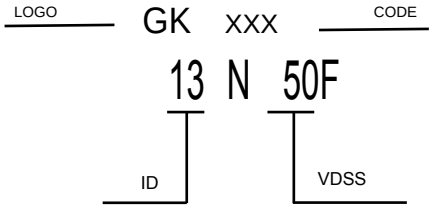
ITO-220AB

GK XXX
13N50F

APPLICATION

- Power Supply
- AC/DC LED Lighting





MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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.

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

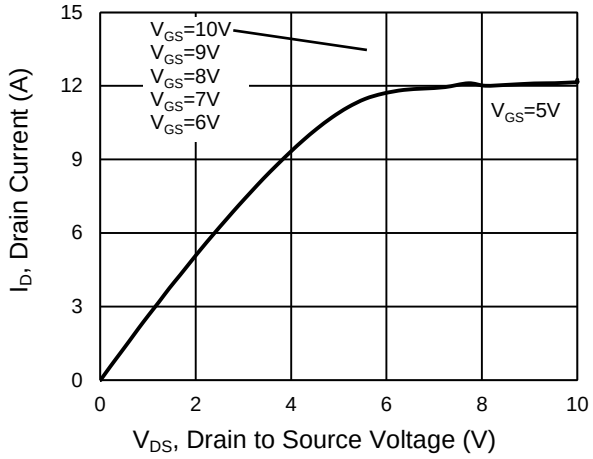
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	500	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	2.5	3	3.8	V
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain 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	--	
Gate-Drain Charge		Q_{gd}	--	12	--	
Input Capacitance	V_{DS} = 50V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	1877	--	pF
Output Capacitance		C_{oss}	--	128	--	
Reverse Transfer Capacitance		C_{rss}	--	7	--	
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	--	
Turn-Off Delay Time		$t_{d(off)}$	--	32	--	
Turn-Off Fall Time		t_f	--	22	--	
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 dI$_F$/dt = 100A/μs	t_{rr}	--	282	--	ns
Reverse Recovery Charge		Q_{rr}	--	2.9	--	μC

Notes:

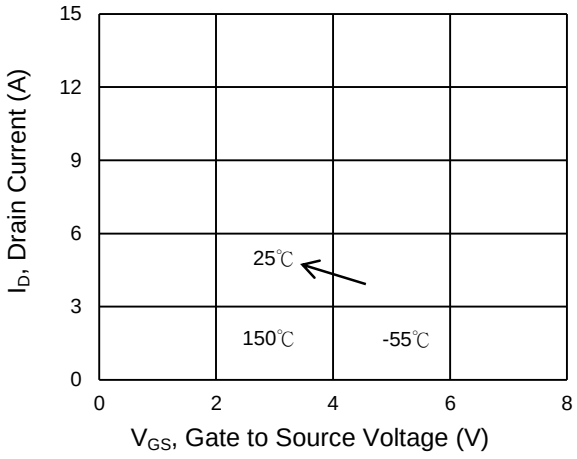
1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 20mH, I_{AS} = 7.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent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

RATING AND CHARACTERISTIC CURVES

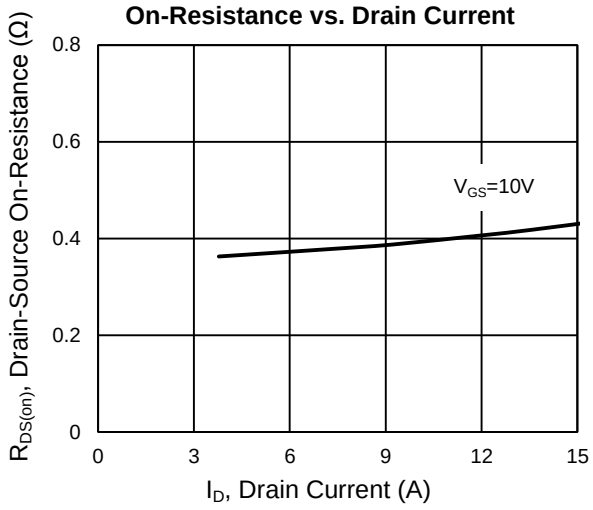
Output Characteristics



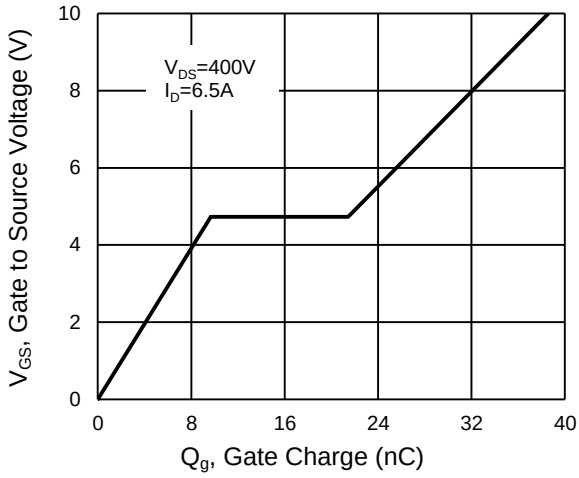
Transfer Characteristics



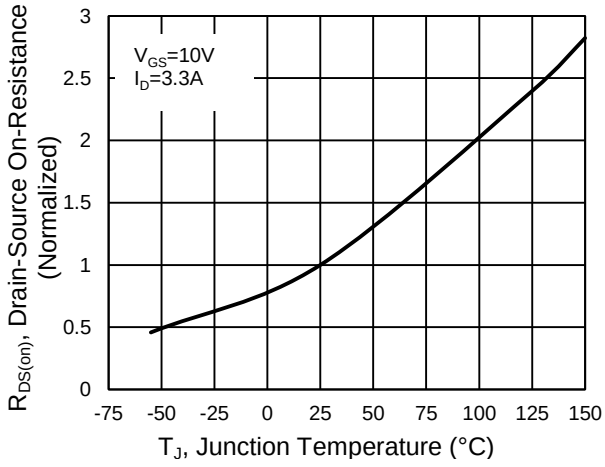
On-Resistance vs. Drain Current



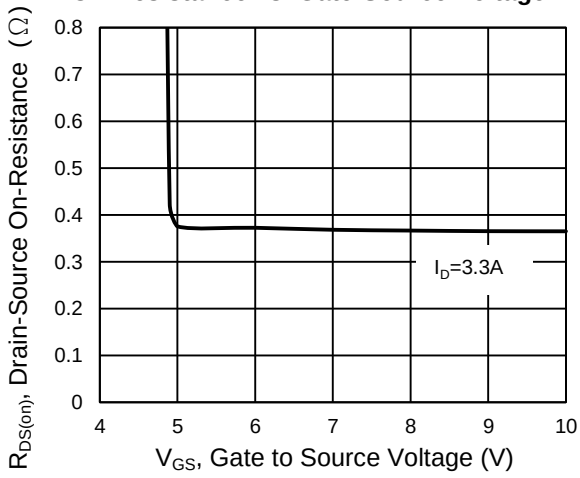
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

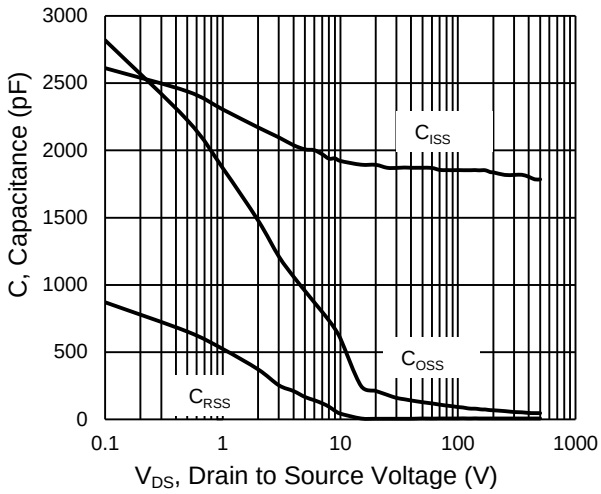


On-Resistance vs. Gate-Source Voltage

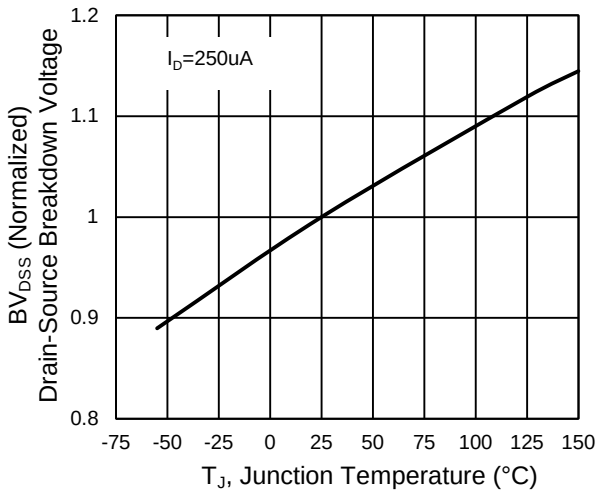


RATING AND CHARACTERISTIC CURVES

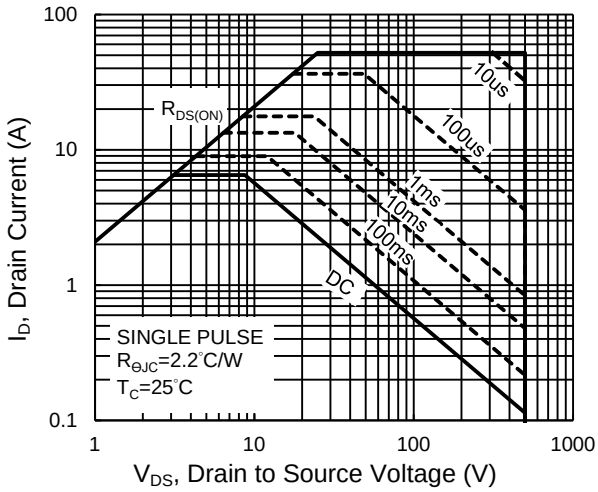
Capacitance vs. Drain-Source Voltage



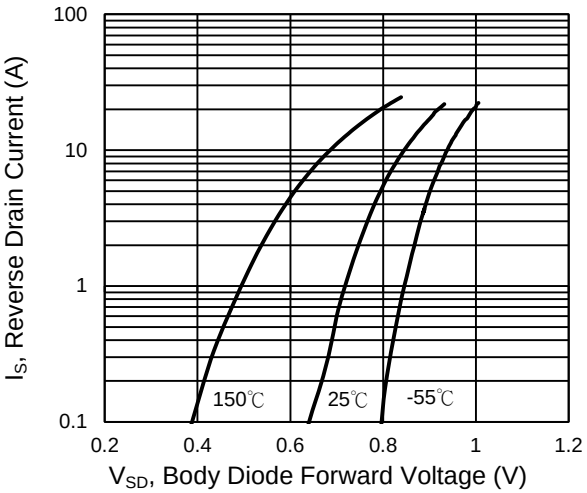
BV_{DSS} vs. Junction Temperature



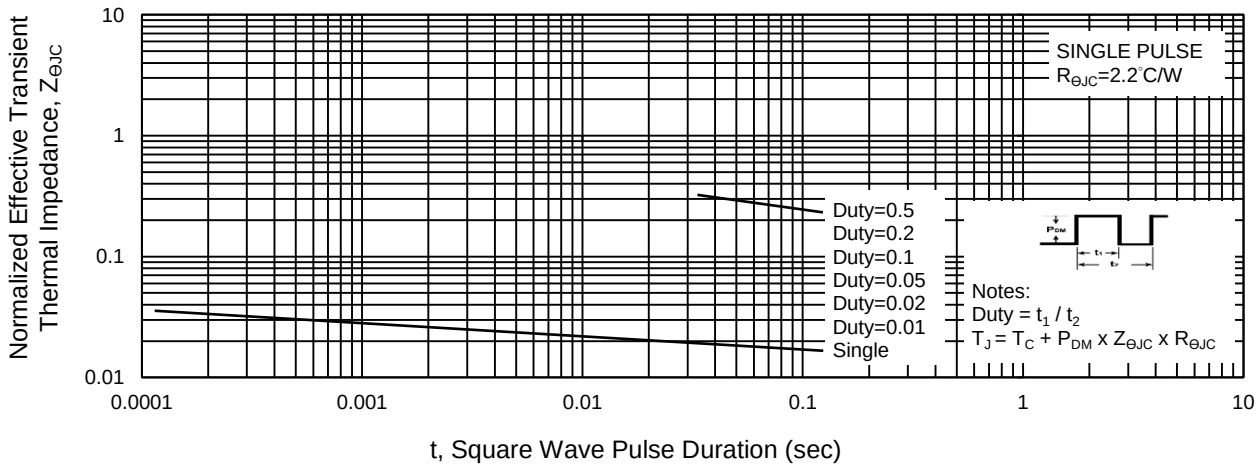
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage



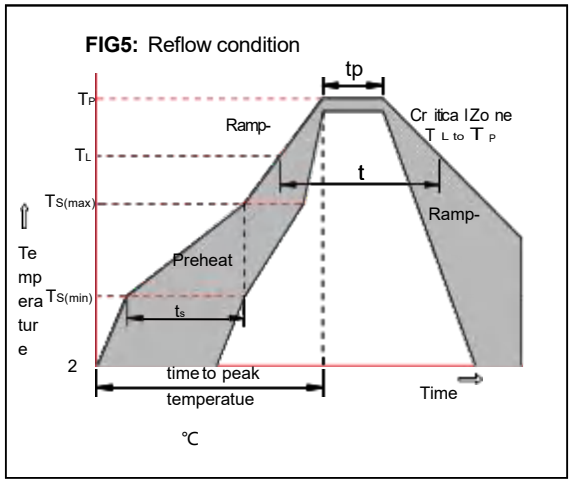
Normalized Thermal Transient Impedance, Junction-to-Case



Soldering parameters

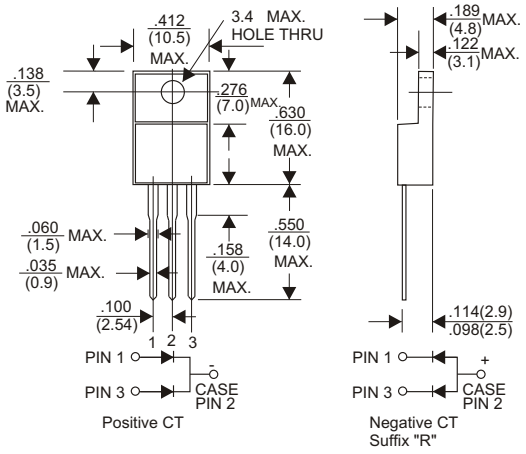
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout

ITO-220AB(FULLYINSULATED)



Dimensions in inches and (millimeters)

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