

N-Channel Power MOSFET

500V, 9A, 0.9Ω

FEATURES

- 100% UIS and R_g tested
- Advanced planar process
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS

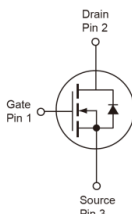
PARAMETER	VALUE	UNIT
V _{DS}	500	V
R _{DS(on)} (max)	0.9	Ω
Q _g	24.5	nC

APPLICATIONS

- Power Supply
- AC/DC LED Lighting



ITO-220



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	9	A
	T _C = 100°C		5.7	A
Pulsed Drain Current ^(Note 2)		I _{DM}	36	A
Total Power Dissipation @ T _C = 25°C		P _{DTOT}	50	W
Single Pulse Avalanche Energy ^(Note 3)		E _{AS}	302.5	mJ
Single Pulse Avalanche Current ^(Note 3)		I _{AS}	5.5	A
Operating Junction and Storage Temperature Range		T _J , T _{STG}	- 55 to +150	°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	MAXIMUM	UNIT
Junction to Case Thermal Resistance	R _{θJC}	2.5	°C/W
Junction to Ambient Thermal Resistance	R _{θJA}	62	°C/W

Thermal Performance Notes: R_{θJA} 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_{θJC} is guaranteed by design while R_{θCA} 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	2.8	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 = 2.3A	R _{DS(on)}	--	0.6	0.9	Ω
Dynamic (Note 5)						
Total Gate Charge	V _{DS} = 400V, I _D = 4.5A, V _{GS} = 10V	Q _g	--	24.5	--	nC
Gate-Source Charge		Q _{gs}	--	5	--	
Gate-Drain Charge		Q _{gd}	--	8.3	--	
Input Capacitance	V _{DS} = 50V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	1116	--	pF
Output Capacitance		C _{oss}	--	83	--	
Reverse Transfer Capacitance		C _{rss}	--	1	--	
Gate Resistance		R _g	--	1	2	Ω
Switching (Note 6)						
Turn-On Delay Time	V _{DD} = 250V, R _G = 5Ω, I _D = 4.5A, V _{GS} = 10V	t _{d(on)}	--	8.6	--	ns
Turn-On Rise Time		t _r	--	19	--	
Turn-Off Delay Time		t _{d(off)}	--	22	--	
Turn-Off Fall Time		t _f	--	21	--	
Source-Drain Diode						
Body-Diode Continuous Forward Current		I _S	--	--	9	A
Body-Diode Pulsed Current		I _{SM}	--	--	36	A
Forward On Voltage (Note 4)	I _S = 4.5A, V _{GS} = 0V	V _{SD}	--	--	1.2	V
Reverse Recovery Time	I _S = 4.5A	t _{rr}	--	225	--	ns
Reverse Recovery Charge	dl _F /dt = 100A/μs	Q _{rr}	--	1.8	--	μC

Notes:

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 20mH, I_{AS} = 5.5A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$.
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

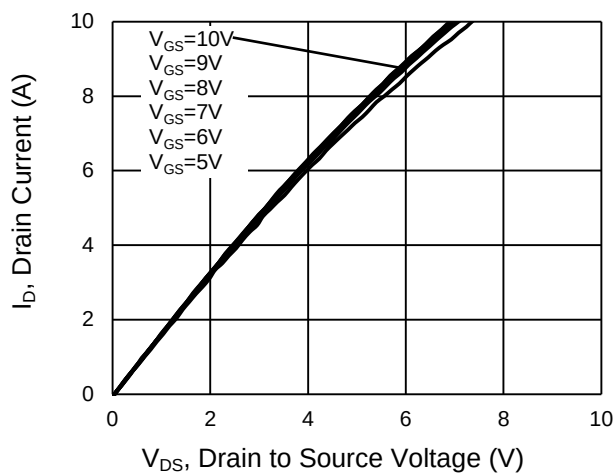
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM9ND50CI C0G	ITO-220	50pcs / Tube

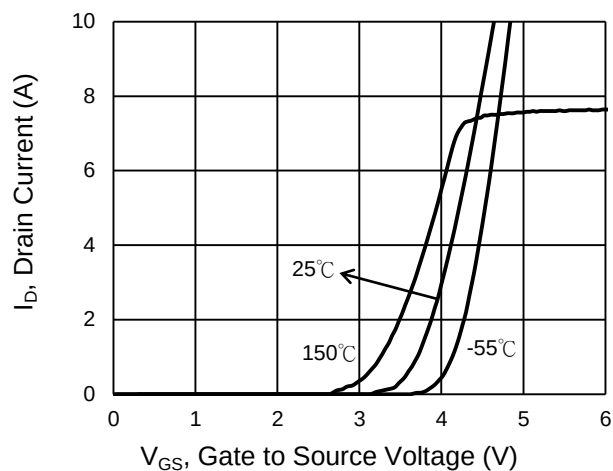
CHARACTERISTICS CURVES

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

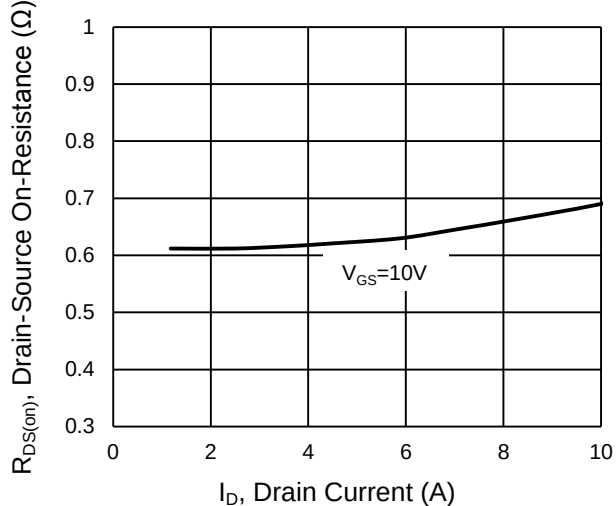
Output Characteristics



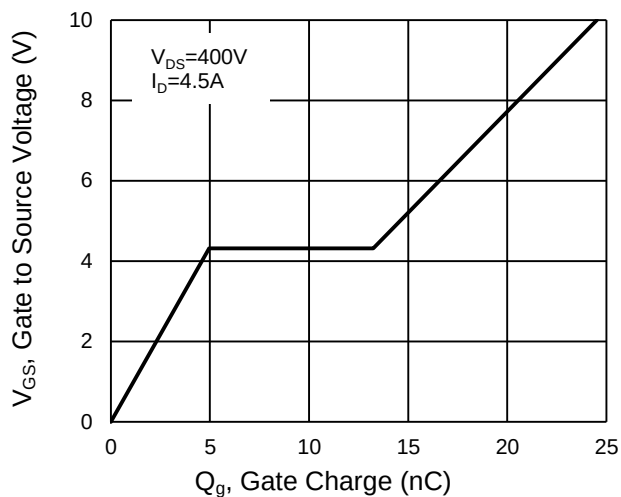
Transfer Characteristics



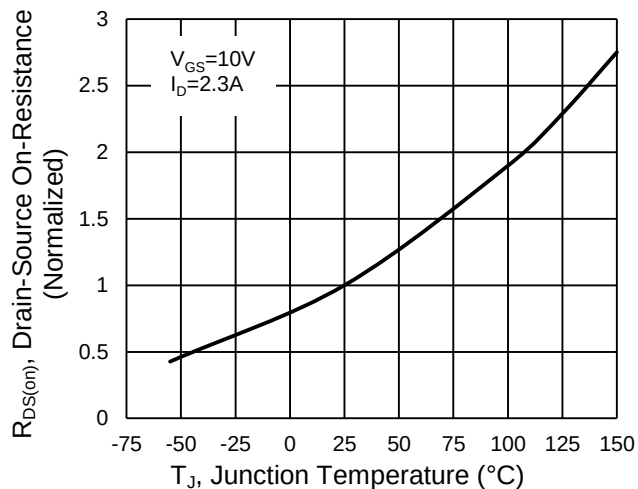
On-Resistance vs. Drain Current



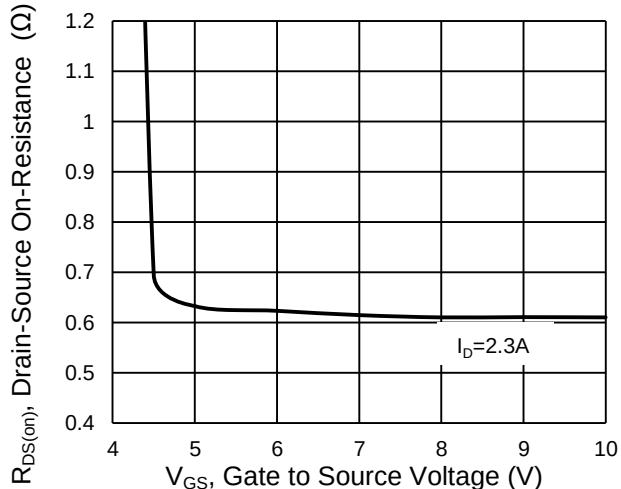
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



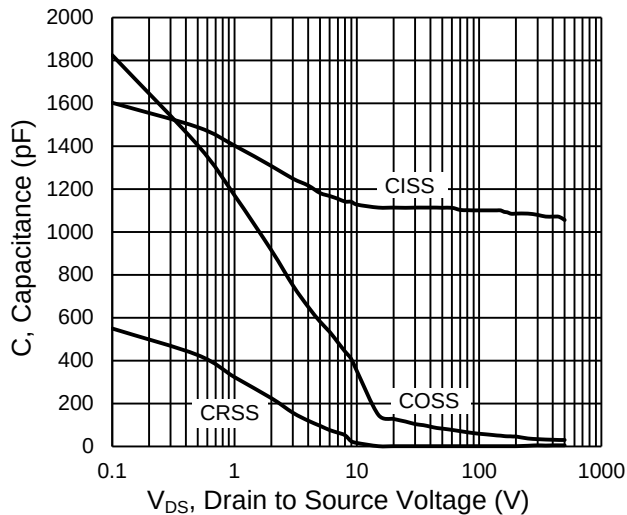
On-Resistance vs. Gate-Source Voltage



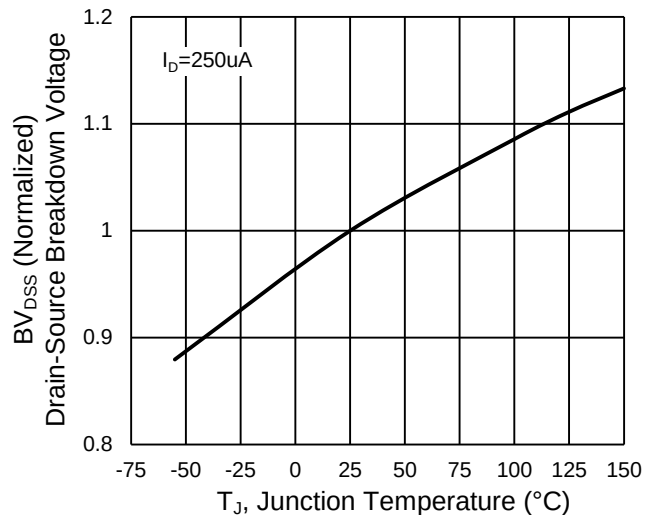
CHARACTERISTICS CURVES

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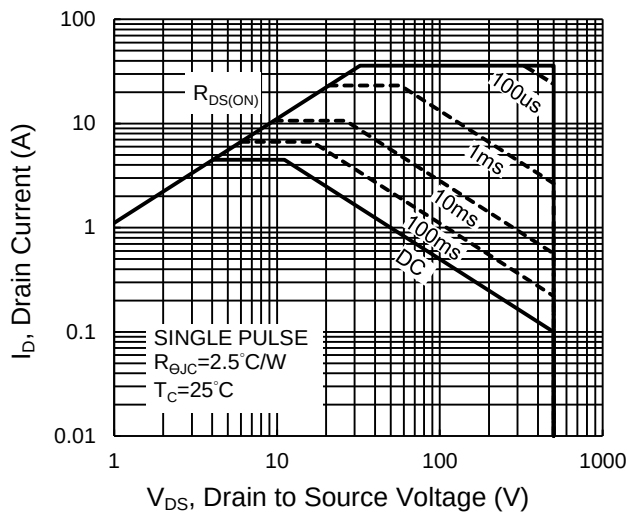
Capacitance vs. Drain-Source Voltage



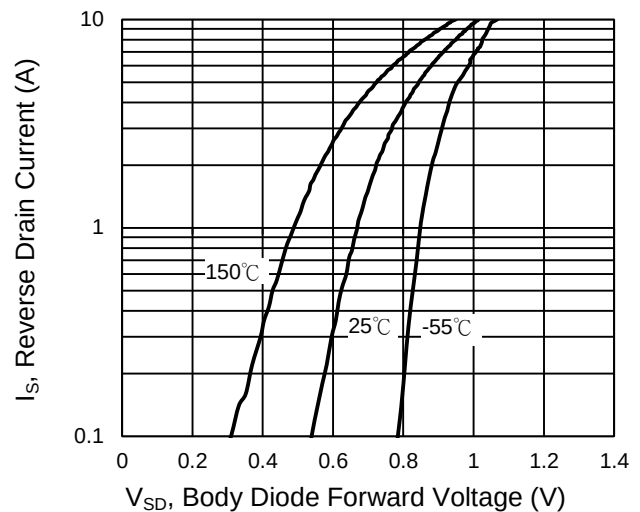
BV_{DSS} vs. Junction Temperature



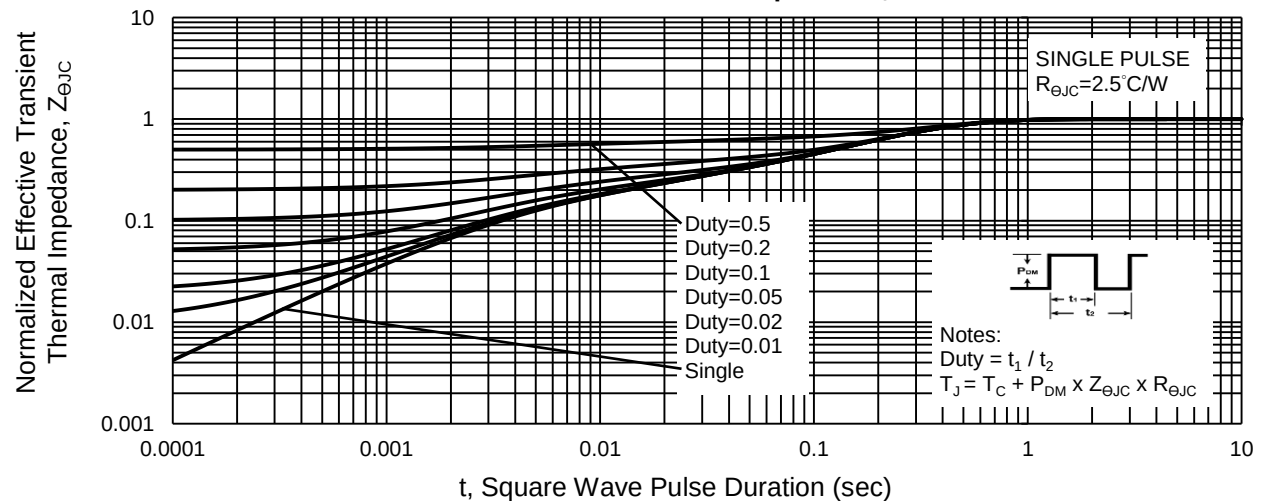
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

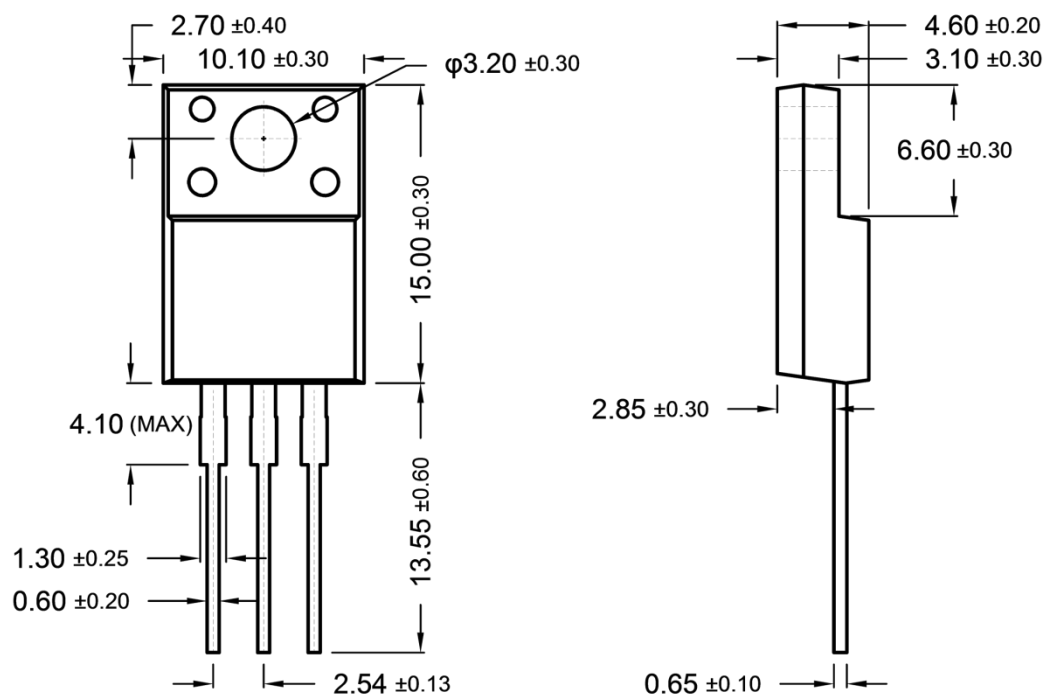


Normalized Thermal Transient Impedance, Junction-to-Case

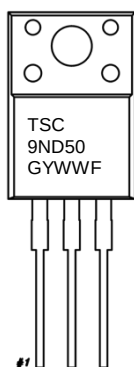


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

ITO-220



MARKING DIAGRAM



- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

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