

N-Channel Power MOSFET

500V, 5A, 1.5Ω

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)	1.5	Ω
Q _g	16	nC

APPLICATIONS

- Power Supply
- AC/DC LED Lighting



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)	I _D	T _C = 25°C	5
		T _C = 100°C	3.2
Pulsed Drain Current (Note 2)	I _{DM}	20	A
Total Power Dissipation @ T _C = 25°C	P _{DTOT}	42	W
Single Pulse Avalanche Energy (Note 3)	E _{AS}	160	mJ
Single Pulse Avalanche Current (Note 3)	I _{AS}	4	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 _{θJC}	3	°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_{θJA} is guaranteed by design while R_{θCA} is determined by the user's board design. R_{θJA} shown below for single device operation on FR-4 PCB with minimum recommended footprint in still air.

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	500	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	2.5	3	3.8	V
Gate Body Leakage	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 500\text{V}, V_{GS} = 0\text{V}$	I_{DSS}	--	--	1	μA
Drain-Source On-State Resistance	$V_{GS} = 10\text{V}, I_D = 1.6\text{A}$	$R_{DS(on)}$	--	1.16	1.5	Ω
Dynamic (Note 5)						
Total Gate Charge	$V_{DS} = 400\text{V}, I_D = 3.2\text{A}, V_{GS} = 10\text{V}$	Q_g	--	16	--	nC
Gate-Source Charge		Q_{gs}	--	3.2	--	
Gate-Drain Charge		Q_{gd}	--	7.2	--	
Input Capacitance	$V_{DS} = 50\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$	C_{iss}	--	603	--	pF
Output Capacitance		C_{oss}	--	50	--	
Reverse Transfer Capacitance		C_{rss}	--	1	--	
Gate Resistance		R_g	--	2	4	Ω
Switching (Note 6)						
Turn-On Delay Time	$V_{DD} = 250\text{V}, R_G = 5\Omega, I_D = 3.2\text{A}, V_{GS} = 10\text{V}$	$t_{d(on)}$	--	6.2	--	ns
Turn-On Rise Time		t_r	--	19	--	
Turn-Off Delay Time		$t_{d(off)}$	--	16	--	
Turn-Off Fall Time		t_f	--	21	--	
Source-Drain Diode (Note 4)						
Body-Diode Continuous Forward Current		I_S	--	--	5	A
Body-Diode Pulsed Current		I_{SM}	--	--	20	A
Forward On Voltage	$I_S = 3.2\text{A}, V_{GS} = 0\text{V}$	V_{SD}	--	--	1.2	V
Reverse Recovery Time	$I_S = 3.2\text{A}$	t_{rr}	--	191	--	ns
Reverse Recovery Charge		$di_F/dt = 100\text{A}/\mu\text{s}$	Q_{rr}	--	1.2	--

Notes:

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 20\text{mH}, I_{AS} = 4\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

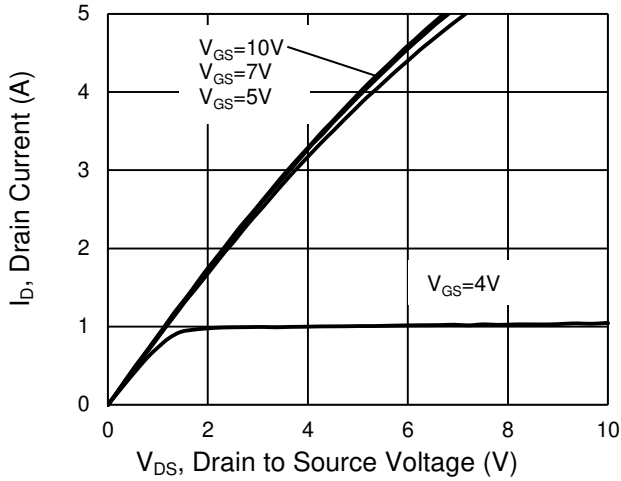
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM5ND50CI C0G	ITO-220	50pcs / Tube

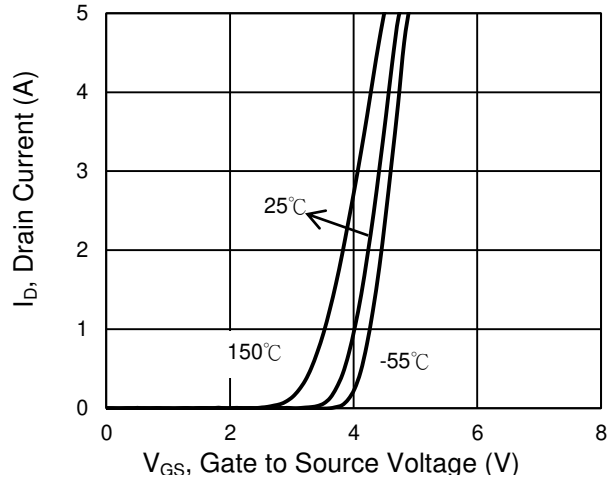
CHARACTERISTICS CURVES

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

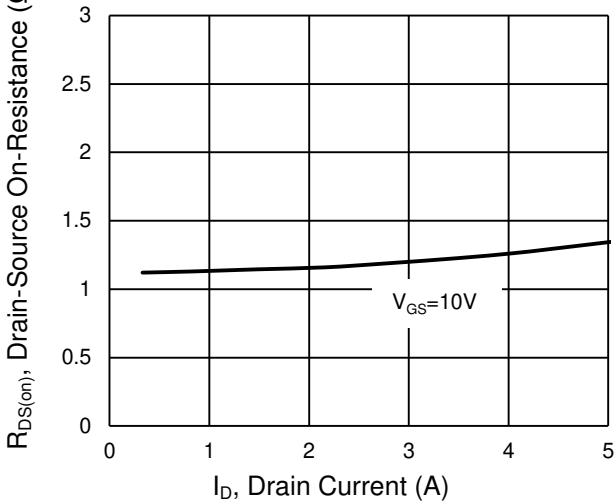
Output Characteristics



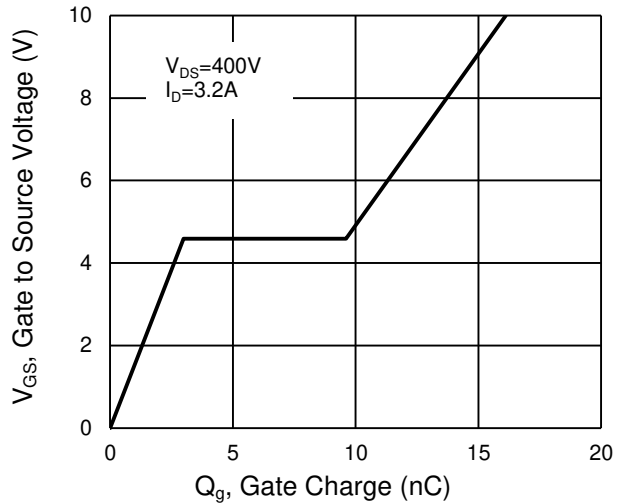
Transfer Characteristics



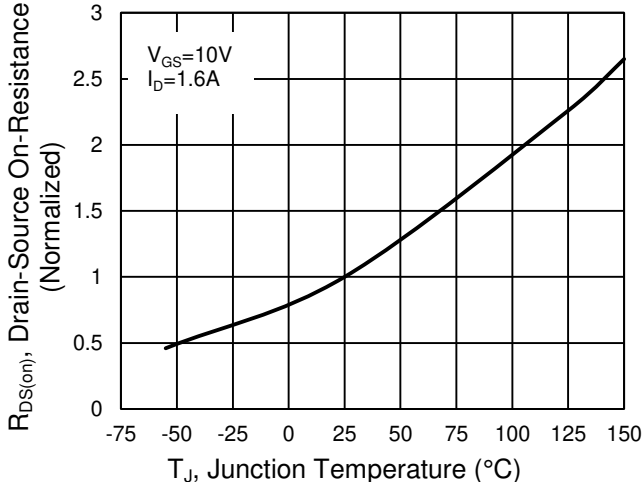
On-Resistance vs. Drain Current



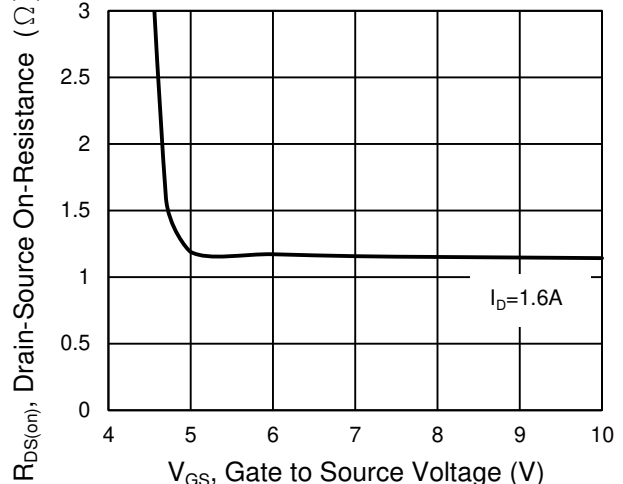
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



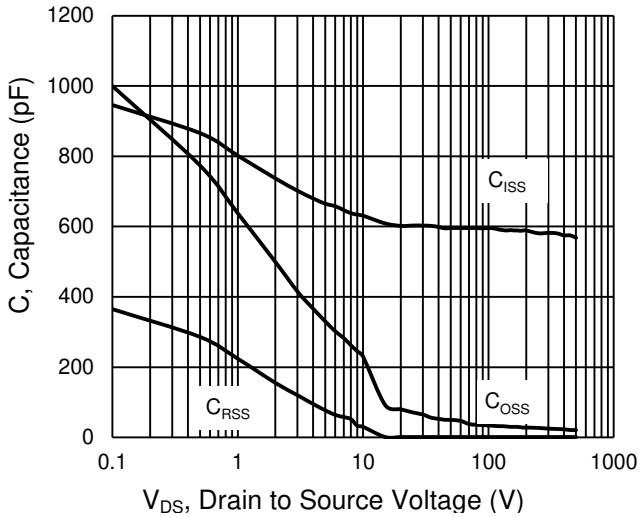
On-Resistance vs. Gate-Source Voltage



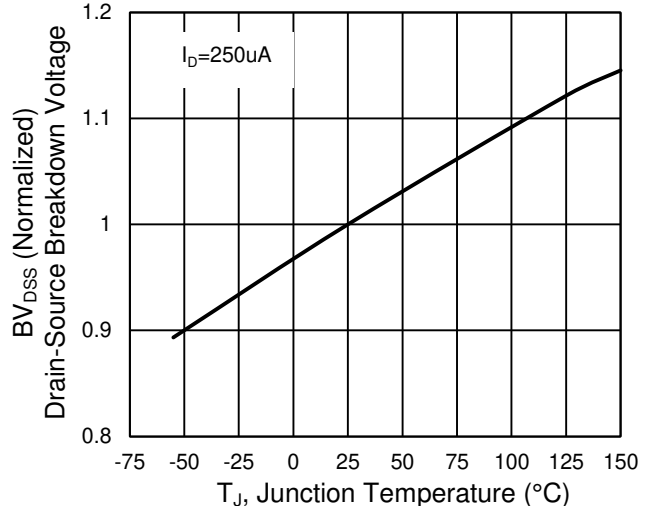
CHARACTERISTICS CURVES

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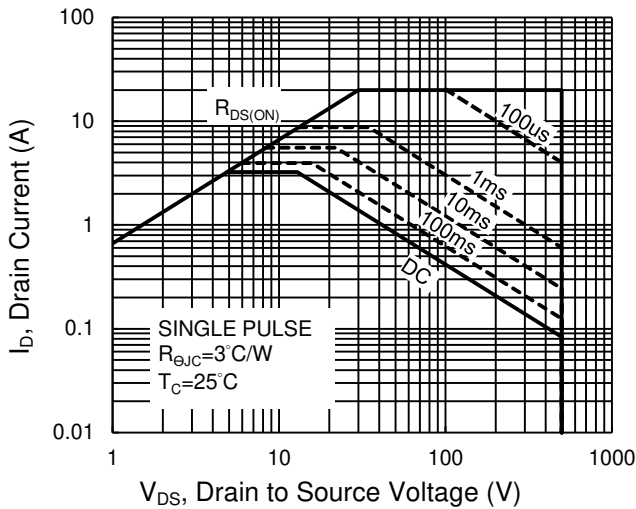
Capacitance vs. Drain-Source Voltage



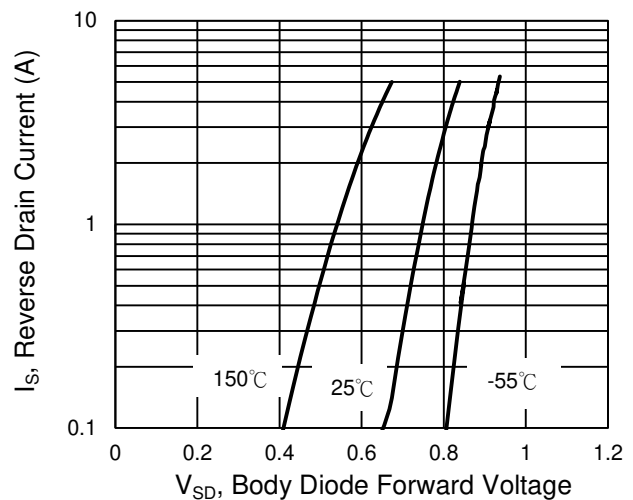
BV_{DSS} vs. Junction Temperature



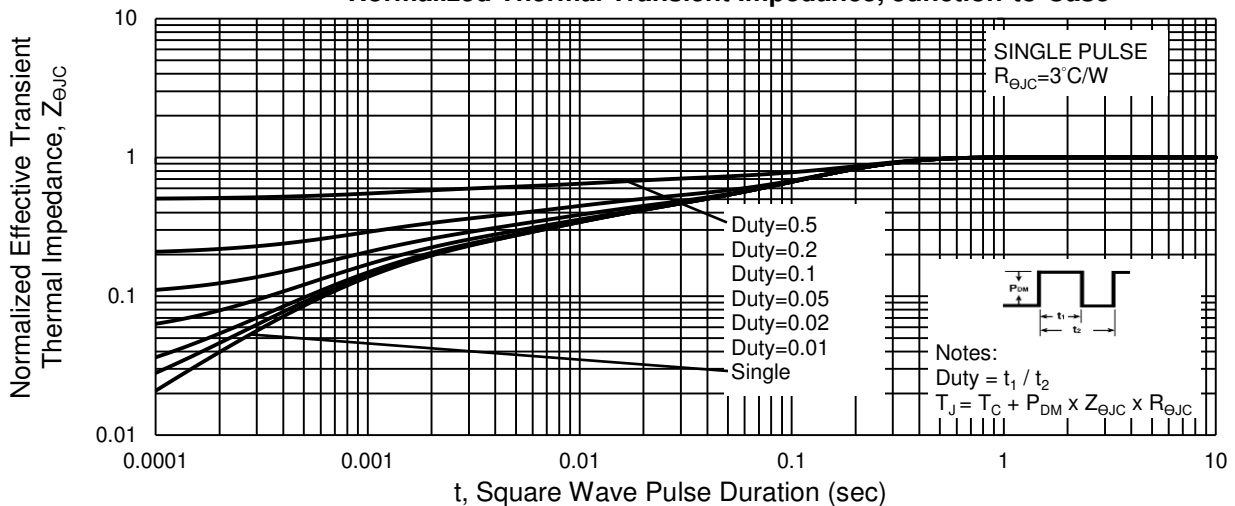
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

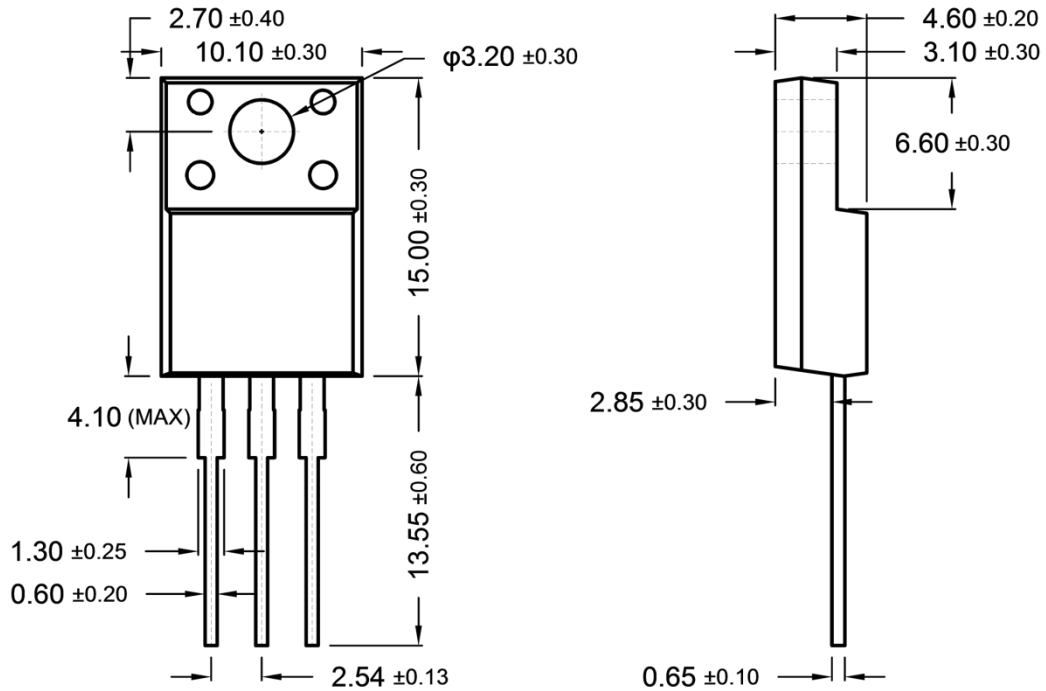


Normalized Thermal Transient Impedance, Junction-to-Case

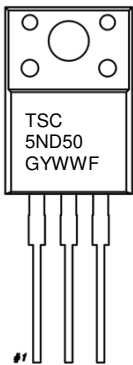


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

ITO-220



MARKING DIAGRAM



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

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