N-Channel Power MOSFET
650V, 10A, 0.8Ω

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
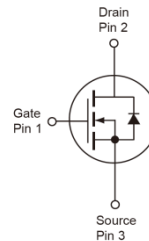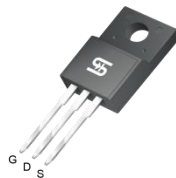- Halogen-free according to IEC 61249-2-21

APPLICATIONS

- AC/DC LED Lighting
- Power Supply

KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
V_{DS}	650	V
$R_{DS(on)}$ (max)	0.8	Ω
Q_g	39.6	nC

Pb-Free RoHS COMPLIANT HALOGEN FREE

ITO-220

Drain Pin 2
Gate Pin 1
Source Pin 3

G D S

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

PARAMETER		SYMBOL	Limit	UNIT
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current [Note 1]	T_C = 25°C	I_D	10	A
	T_C = 100°C		6.3	
Pulsed Drain Current [Note 2]		I_{DM}	40	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	56.8	W
Single Pulse Avalanche Energy [Note 3]		E_{AS}	435	mJ
Single Pulse Avalanche Current [Note 3]		I_{AS}	6.6	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$_{DSS}$	650	--	--	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$_{DS}$ = 650V, V$_{GS}$ = 0V	I$_{DSS}$	--	--	1	μA
Drain-Source On-State Resistance (Note 4)	V$_{GS}$ = 10V, I$_D$ = 2.5A	R$_{DS(on)}$	--	0.59	0.8	Ω
Dynamic (Note 5)						
Total Gate Charge	V$_{DS}$ = 520V, I$_D$ = 5A, V$_{GS}$ = 10V	Q$_g$	--	39.6	--	nC
Gate-Source Charge		Q$_{gs}$	--	8.1	--	
Gate-Drain Charge		Q$_{gd}$	--	12.5	--	
Input Capacitance	V$_{DS}$ = 50V, V$_{GS}$ = 0V, f = 1.0MHz	C$_{iss}$	--	1863	--	pF
Output Capacitance		C$_{oss}$	--	108	--	
Reverse Transfer Capacitance		C$_{rss}$	--	9	--	
Gate Resistance		R$_g$	--	1.3	2.6	Ω
Switching (Note 6)						
Turn-On Delay Time	V$_{DD}$ = 325V, R$_G$ = 5Ω, I$_D$ = 5A, V$_{GS}$ = 10V	t$_{d(on)}$	--	11	--	ns
Turn-On Rise Time		t$_r$	--	20	--	
Turn-Off Delay Time		t$_{d(off)}$	--	36	--	
Turn-Off Fall Time		t$_f$	--	23	--	
Source-Drain Diode						
Body-Diode Continuous Forward Current		I$_S$	--	--	10	A
Body-Diode Pulsed Current		I$_{SM}$	--	--	40	A
Forward Voltage (Note 4)	I$_S$ = 5A, V$_{GS}$ = 0V	V$_{SD}$	--	--	1.2	V
Reverse Recovery Time	I$_S$ = 5A	t$_{rr}$	--	253	--	ns
Reverse Recovery Charge	dI$_F$/dt = 100A/μs	Q$_{rr}$	--	2.5	--	μC

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 20mH, I$_{AS}$ = 6.6A, 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.
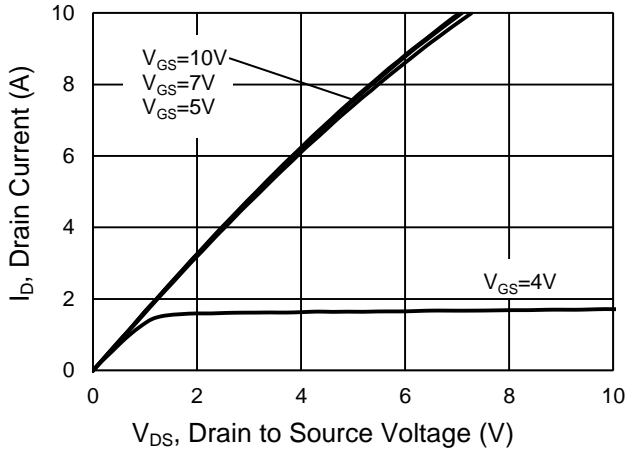6. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

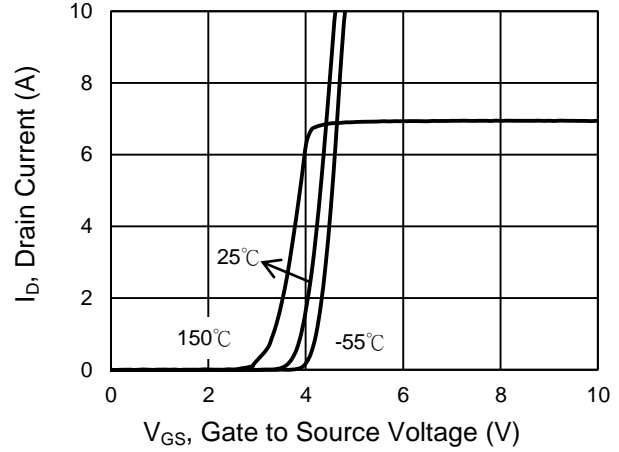| PART NO.	PACKAGE	PACKING
TSM10ND65CI C0G	ITO-220	50pcs / Tube

CHARACTERISTICS CURVES
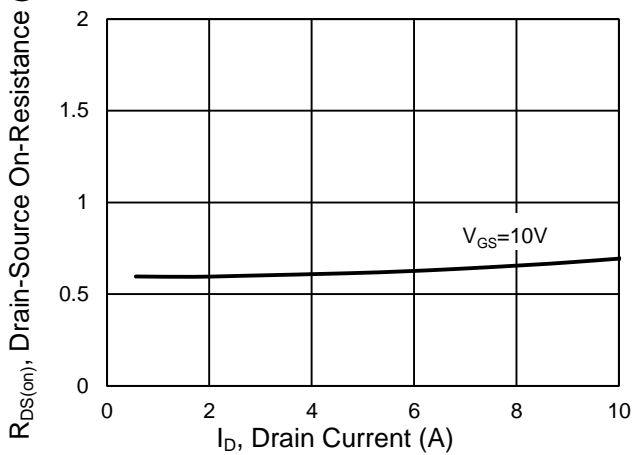
(T_C = 25°C unless otherwise noted)
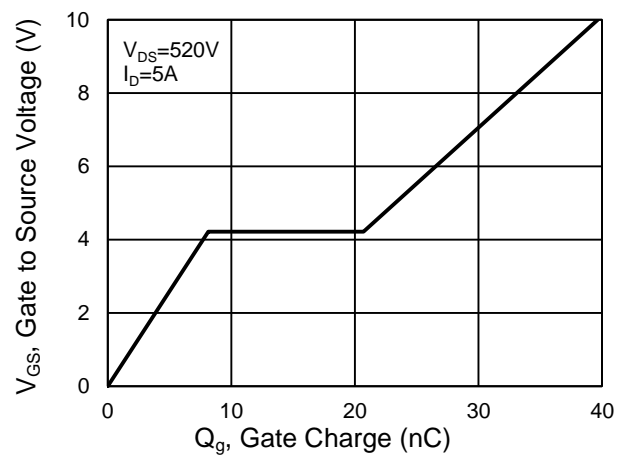
Output Characteristics
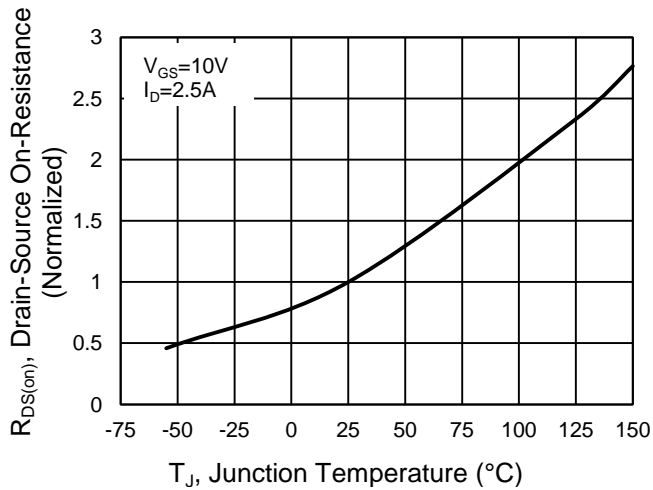

Transfer Characteristics

On-Resistance vs. Drain Current

Gate-Source Voltage vs. Gate Charge
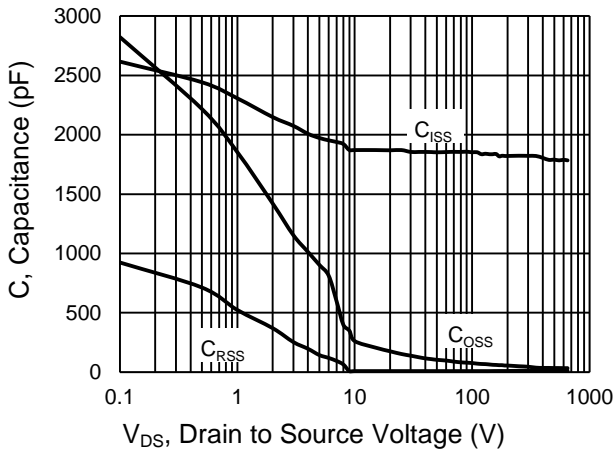

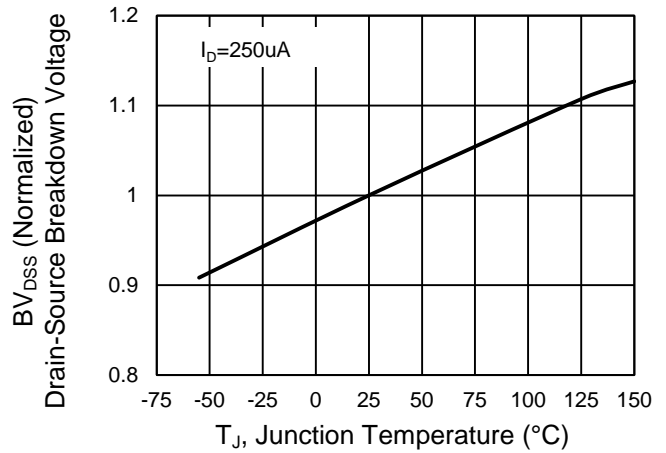**On-Resistance vs. Junction Temperature**

On-Resistance vs. Gate-Source Voltage

Version: A1804
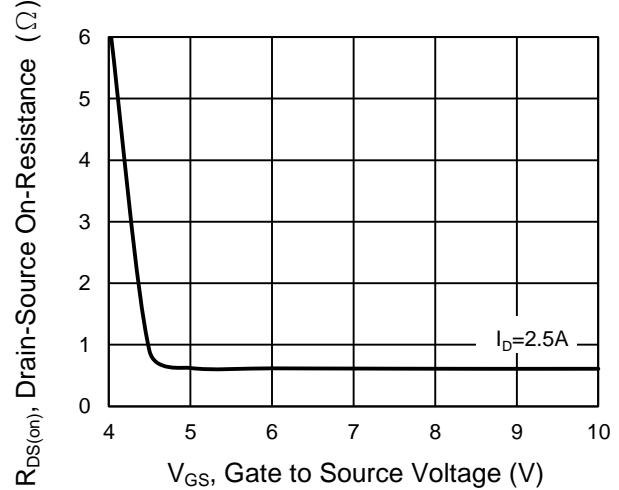
CHARACTERISTICS CURVES

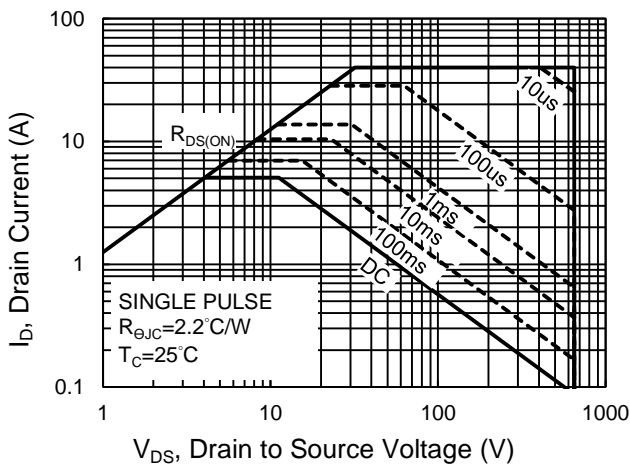(T_C = 25°C unless otherwise noted)

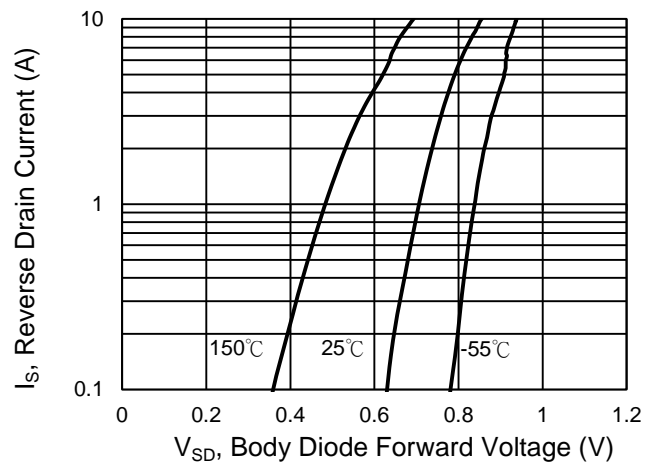**Capacitance vs. Drain-Source Voltage**

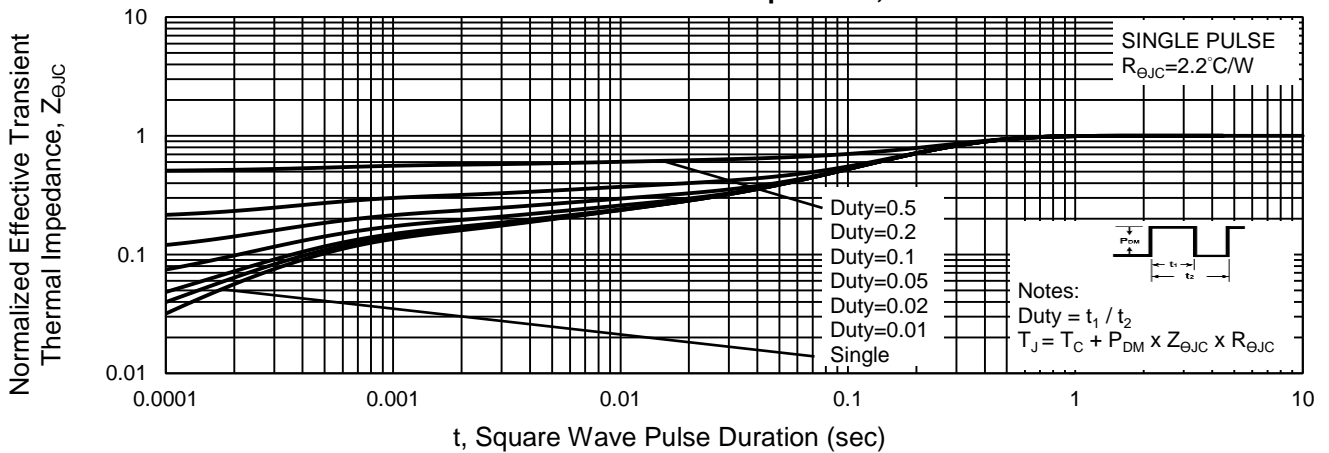**BV_{DSS} vs. Junction Temperature**

Maximum Safe Operating Area, Junction-to-Case

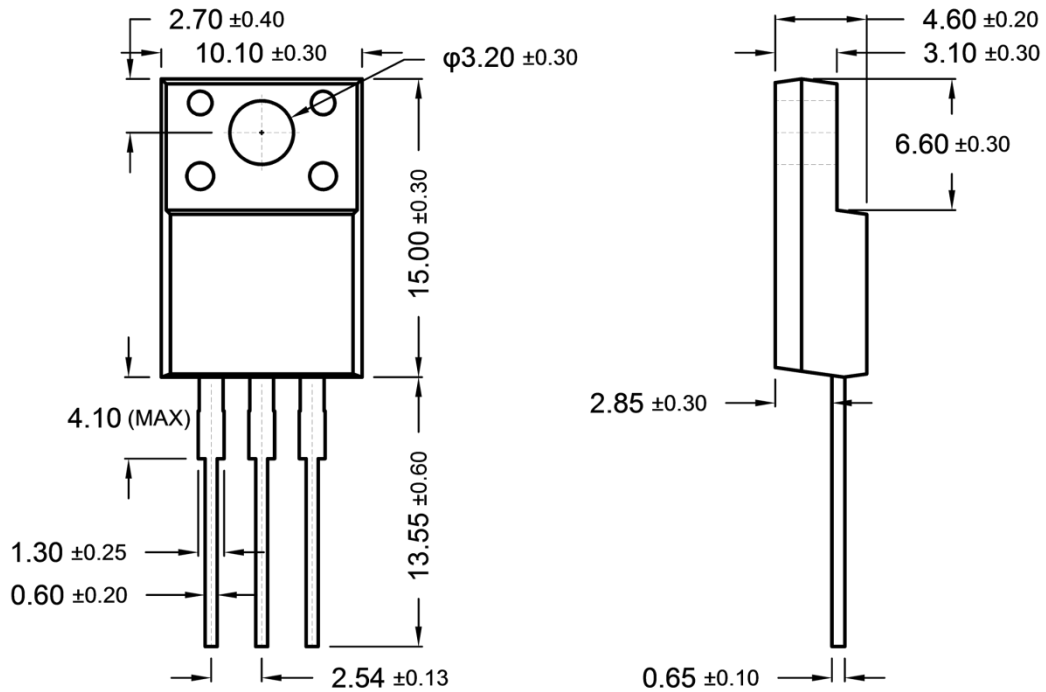**Source-Drain Diode Forward Current vs. Voltage**

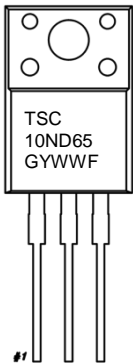**Normalized Thermal Transient Impedance, Junction-to-Case**

SINGLE PULSE
$R_{\theta JC}$=2.2°C/W

Duty=0.5
Duty=0.2
Duty=0.1
Duty=0.05
Duty=0.02
Duty=0.01
Single

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

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

ITO-220

MARKING DIAGRAM

TSC
10ND65
GYWWF

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

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