N-Channel Power MOSFET

900V, 4A, 4.0Ω

FEATURES

- Low $R_{DS(ON)}$ 4Ω (Max.)
- Low gate charge typical @ 25nC (Typ.)
- Improve dV/dt capability

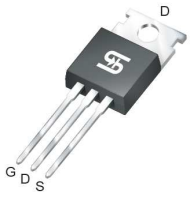
KEY PERFORMANCE PARAMETERS		
PARAMETER	**VALUE**	**UNIT**
V_{DS}	900	V
$R_{DS(on)}$ (max)	4	Ω
Q_g	25	nC

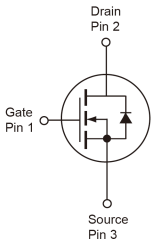
APPLICATION

- High efficiency switch mode power Supply
- Lighting

Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-220 **ITO-220**





Notes: Moisture sensitivity level: level 3. Per J-STD-020

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)					
PARAMETER		**SYMBOL**	**TO-220**	**ITO-220**	**UNIT**
Drain-Source Voltage		V_{DS}	900		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	4	4*	A
	T_C = 100°C		2.2	2.2*	
Pulsed Drain Current (Note 2)		I_{DM}	16	16 *	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	123	38.7	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	474		mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	4		A
Repetitive Avalanche Energy (Note 2)		E_{AR}	12.3		mJ
Peak Diode Recovery (Note 7)		dV/dt	4.5		V
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150		°C

THERMAL PERFORMANCE				
PARAMETER	**SYMBOL**	**TO-220**	**ITO-220**	**UNIT**
Junction to Case Thermal Resistance	$R_{\Theta JC}$	1.01	3.23	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	62.5		°C/W

Notes: $R_{\Theta JA}$ 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. $R_{\Theta JA}$ shown below for single device operation on FR-4 PCB in still air.

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Static (Note 4)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	900	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	2	--	4	V
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 900V, V_{GS} = 0V	I_{DSS}	--	--	10	μA
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 2.0A	$R_{DS(on)}$	--	3.2	4.0	Ω
Forward Transconductance	V_{DS} = 30V, I_D = 2.0A	g_{fs}	--	6	--	S
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 720V, I_D = 4.0A, V_{GS} = 10V	Q_g	--	25	--	nC
Gate-Source Charge		Q_{gs}	--	4.8	--	
Gate-Drain Charge		Q_{gd}	--	10.2	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	955	--	pF
Output Capacitance		C_{oss}	--	80	--	
Gate Resistance	F = 1MHz, open drain	R_g	--	--	4	Ω
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 450V, R_{GEN} = 25Ω, I_D = 4.0A, V_{GS} = 10V,	$t_{d(on)}$	--	49	--	ns
Turn-On Rise Time		t_r	--	38	--	
Turn-Off Delay Time		$t_{d(off)}$	--	146	--	
Turn-Off Fall Time		t_f	--	50	--	
Source-Drain Diode (Note 4)						
Forward On Voltage	I_S = 4.0A, V_{GS} = 0V	V_{SD}	--	--	1.5	V
Reverse Recovery Time	V_{GS} = 0V, I_S = 4A dI_F/dt = 100A/μs	t_{rr}	--	487	--	ns
Reverse Recovery Charge		Q_{rr}	--	2.8	--	μC

Notes:

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3. L = 56mH, I_{AS} = 4.0A, 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.
7. I_{SD} ≤ 4A, dI/dt ≤ 200A/uS, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM4N90CZ C0G	TO-220	50pcs / Tube
TSM4N90CI C0G	ITO-220	50pcs / Tube

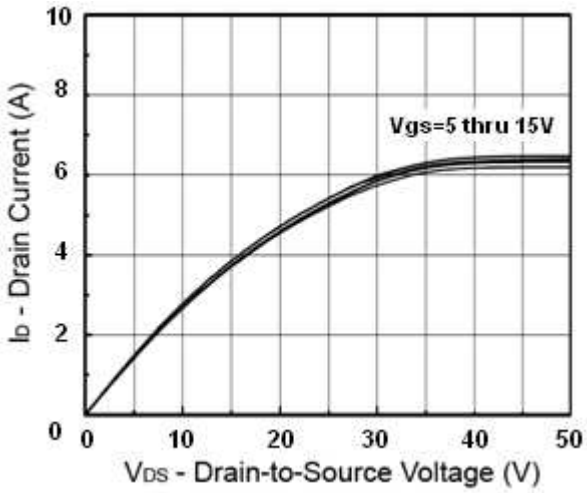
Note:

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

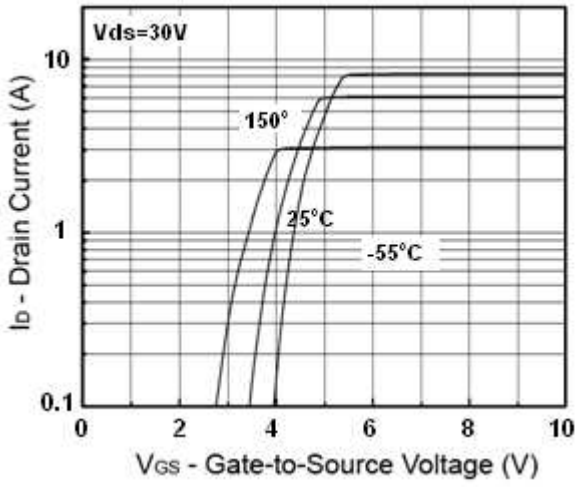
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

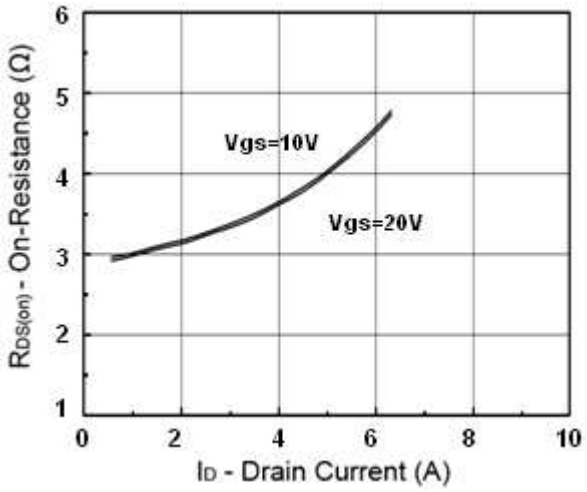
Output Characteristics



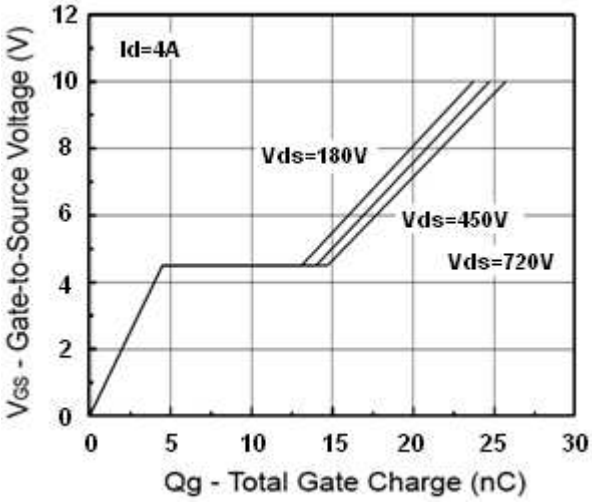
Transfer Characteristics



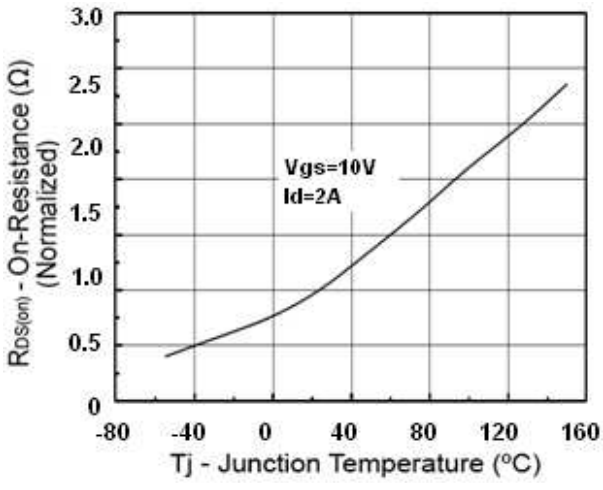
On-Resistance vs. Drain Current



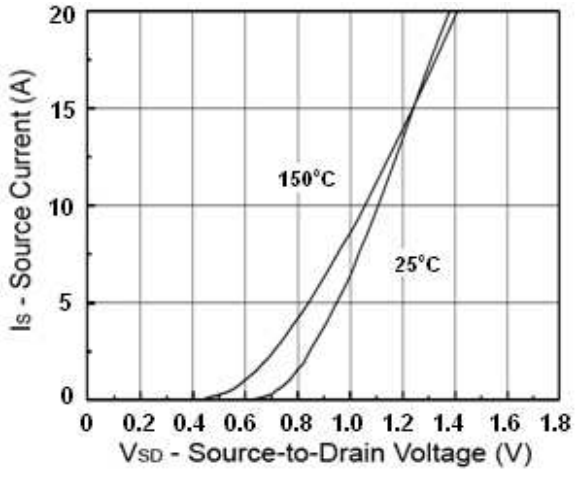
Gate Charge



On-Resistance vs. Junction Temperature



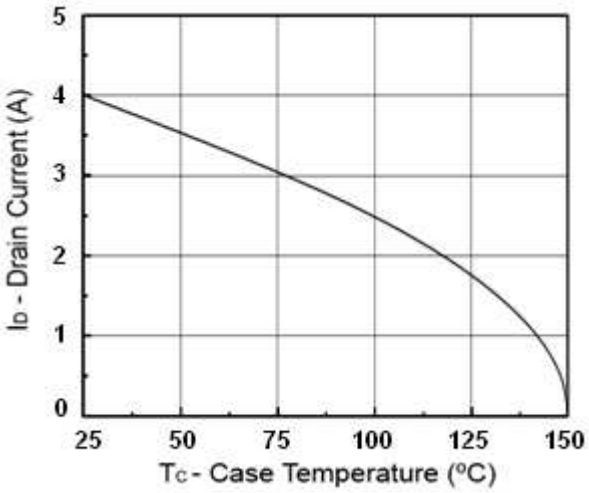
Source-Drain Diode Forward Voltage



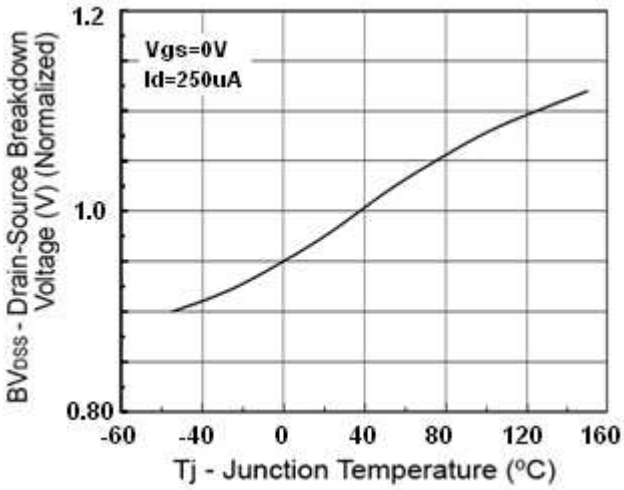
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

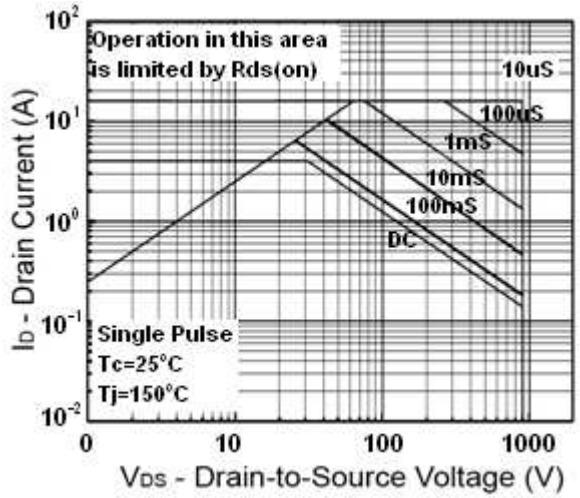
Drain Current vs. Case Temperature



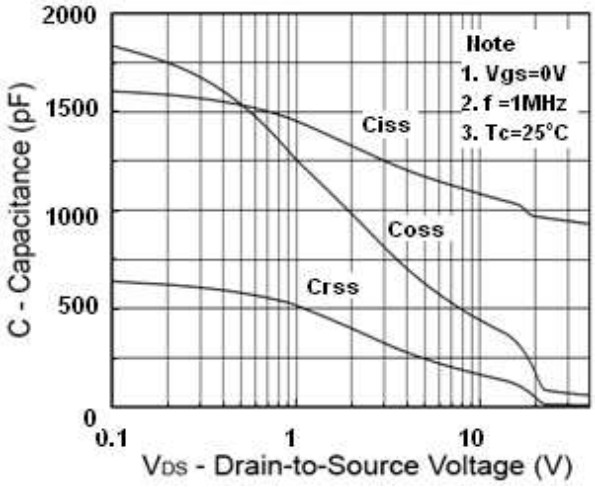
BV_{DSS} vs. Junction Temperature



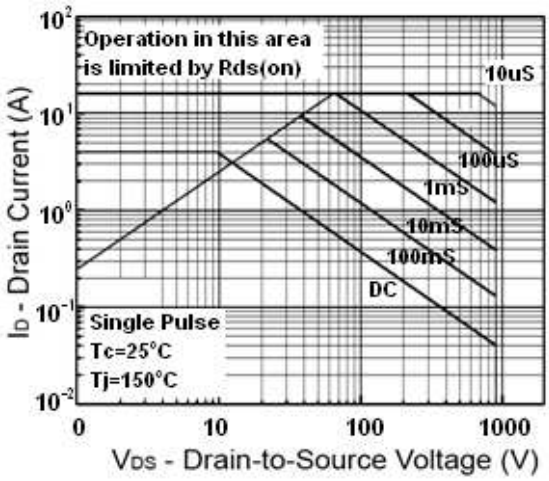
Maximum Safe Operating Area



Capacitance vs. Drain-Source Voltage



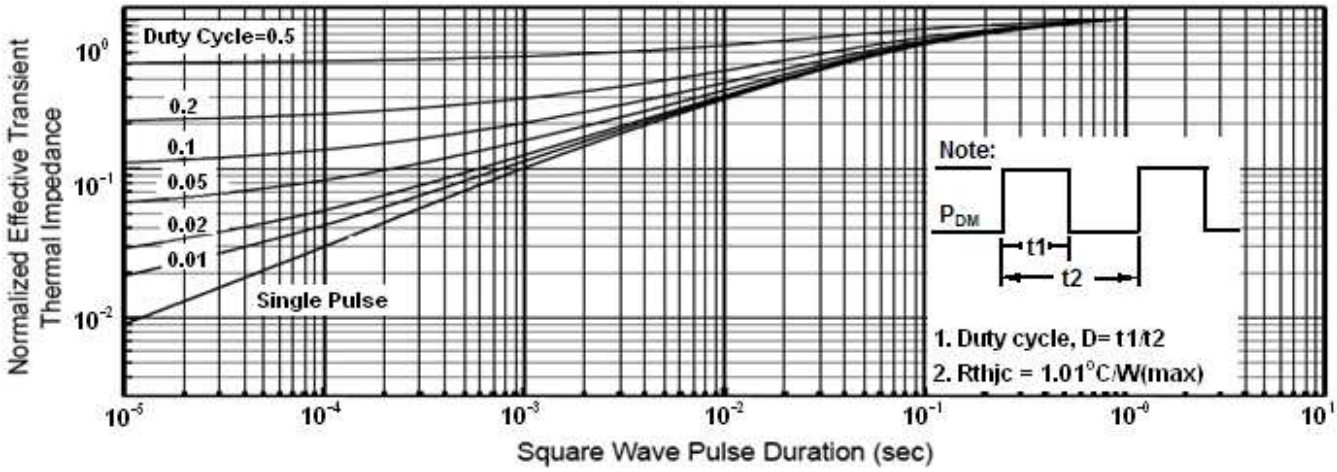
Maximum Safe Operating Area (ITO-220)



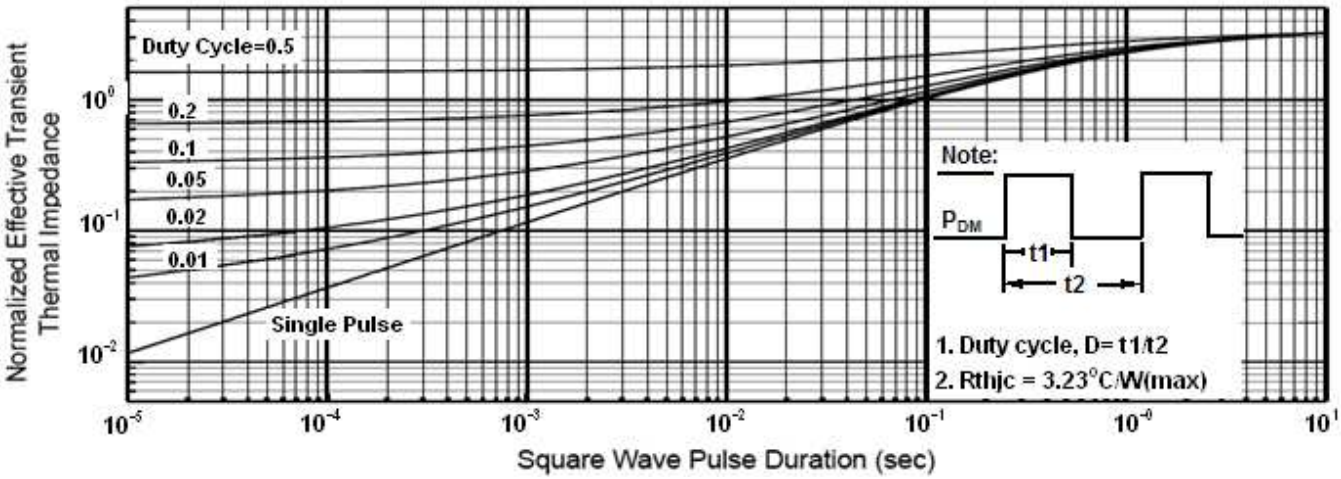
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Ambient (TO-220)

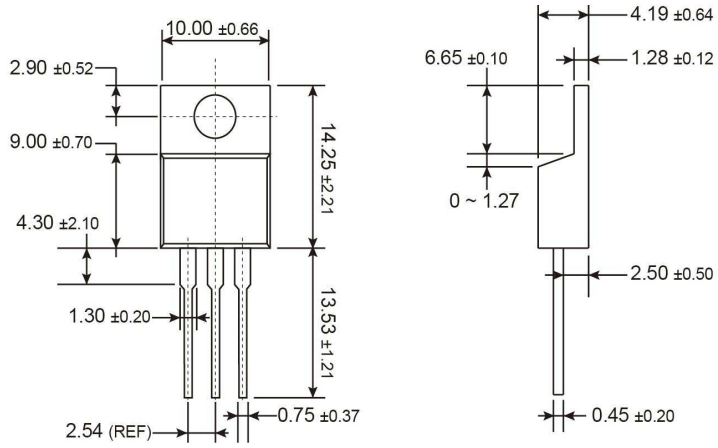


Normalized Thermal Transient Impedance, Junction-to-Ambient (ITO-220)

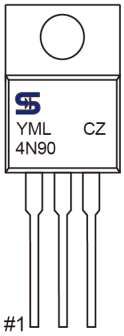


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-220



MARKING DIAGRAM



Y = Year Code

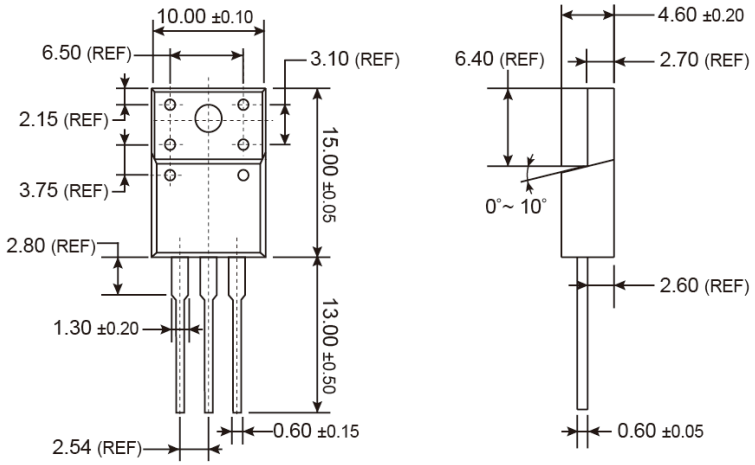
M = Month Code for Halogen Free Product

O	=Jan	**P**	=Feb	**Q**	=Mar	**R**	=Apr
S	=May	**T**	=Jun	**U**	=Jul	**V**	=Aug
W	=Sep	**X**	=Oct	**Y**	=Nov	**Z**	=Dec

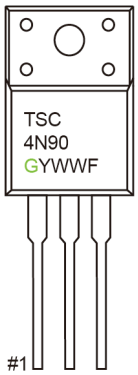
L = Lot Code (1~9, A~Z)

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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