

N-Channel Power MOSFET

FEATURES

- Super-Junction technology
- High performance good FOM
- High ruggedness performance
- 100% UIS & R_g tested
- High commutation performance
- ROHS Compliant
- Halogen-free

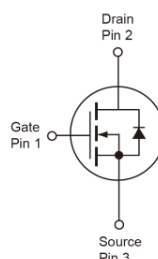
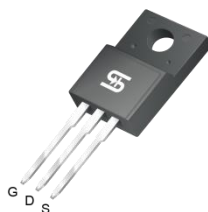
APPLICATIONS

- Power Supply
- AC/DC LED Lighting

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(on)}$ (max)	390	m Ω
$Q_{g,typ}$	22	nC



ITO-220



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage	static	V_{GS}	± 20	V
	AC($f > 1\text{Hz}$)		± 30	
Continuous Drain Current (Note 1)	$T_C = 25^\circ\text{C}$	I_D	11	A
	$T_C = 100^\circ\text{C}$		8	A
Pulsed Drain Current (Note 2)		I_{DM}	33	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$		P_D	78	W
Single Pulse Avalanche Energy (Note 3)		E_{AS}	300	mJ
Single Pulse Avalanche Current (Note 3)		I_{AS}	3.5	A
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	1.6	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	$^\circ\text{C/W}$

Thermal Performance Note: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. $R_{\theta JA}$ is guaranteed by design while $R_{\theta JC}$ 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 (Note 4)						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 1mA	BV _{DSS}	600	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 1mA	V _{GS(TH)}	3	--	5	V
Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = 600V, V _{GS} = 0V	I _{DSS}	--	--	100	μA
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 3.8A	R _{DS(on)}	--	350	390	mΩ
Dynamic (Note 5)						
Total Gate Charge	V _{DS} = 300V, I _D = 11A, V _{GS} = 10V	Q _g	--	21.3	--	nC
Gate-Source Charge		Q _{gs}	--	6.2	--	
Gate-Drain Charge		Q _{gd}	--	9.9	--	
Input Capacitance	V _{DS} = 300V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	814	--	pF
Output Capacitance		C _{oss}	--	27	--	
Reverse Transfer Capacitance		C _{rss}	--	13	--	
Gate Resistance	f = 1.0MHz	R _g	0.5	1.7	3.4	Ω
Switching (Note 6)						
Turn-On Delay Time	V _{DD} = 300V, R _G = 10Ω, I _D = 5.5A, V _{GS} = 10V	t _{d(on)}	--	16.5	--	nS
Turn-On Rise Time		t _r	--	13.4	--	
Turn-Off Delay Time		t _{d(off)}	--	39.2	--	
Turn-Off Fall Time		t _f	--	10	--	
Source-Drain Diode (Note 4)						
Body-Diode Continuous Forward Current		I _S	--	--	11	A
Body-Diode Pulsed Current		I _{SM}	--	--	44	A
Forward Voltage	I _S = 11A, V _{GS} = 0V	V _{SD}	--	0.9	1.5	V
Reverse Recovery Time	I _S = 11A dI _F /dt = 100A/μs	t _{rr}	--	307.4	--	nS
Reverse Recovery Charge		Q _{rr}	--	3.2	--	μC

Notes:

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3. $L = 50mH, I_{AS} = 3.3A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
4. Pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$.
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

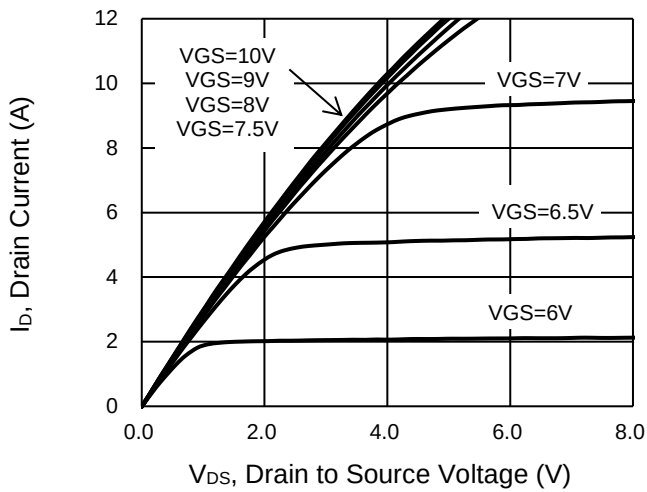
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM60NC390CI C0G	ITO-220	50pcs / Tube

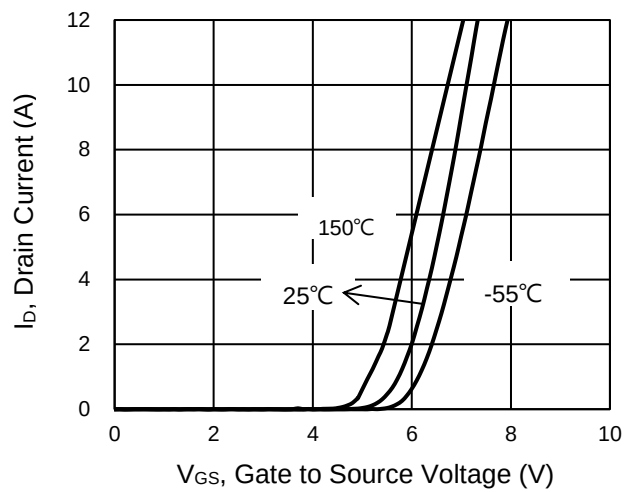
CHARACTERISTICS CURVES

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

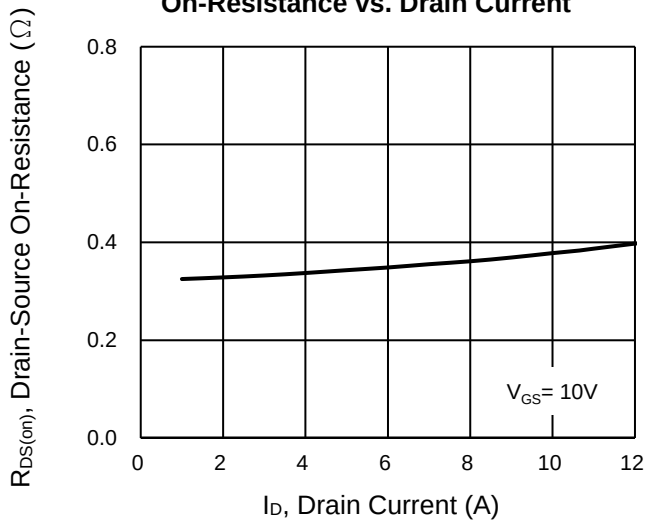
Output Characteristics



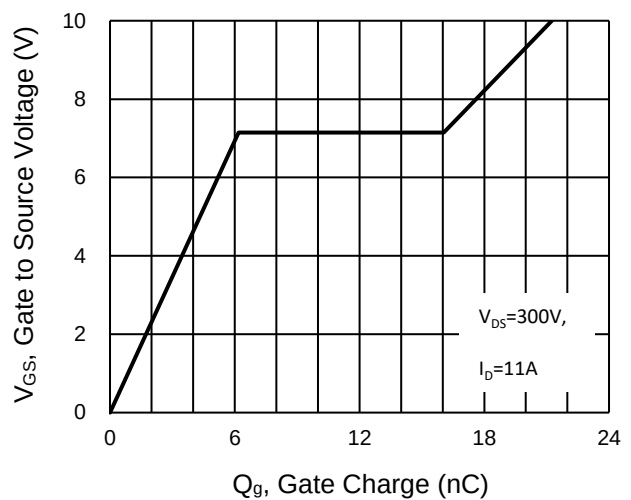
Transfer Characteristics



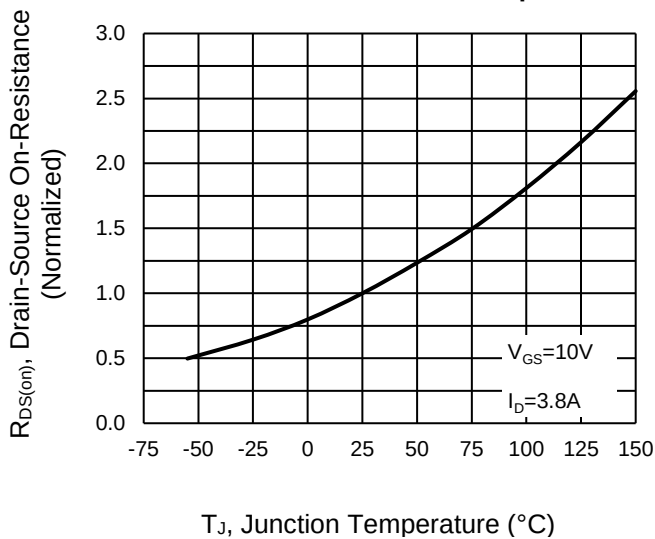
On-Resistance vs. Drain Current



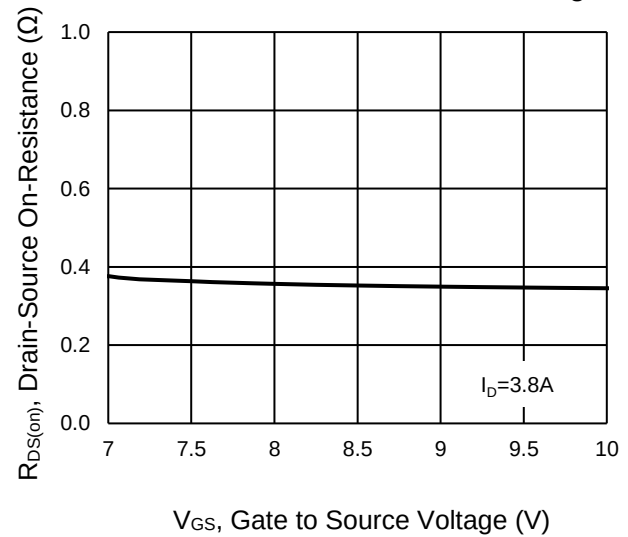
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



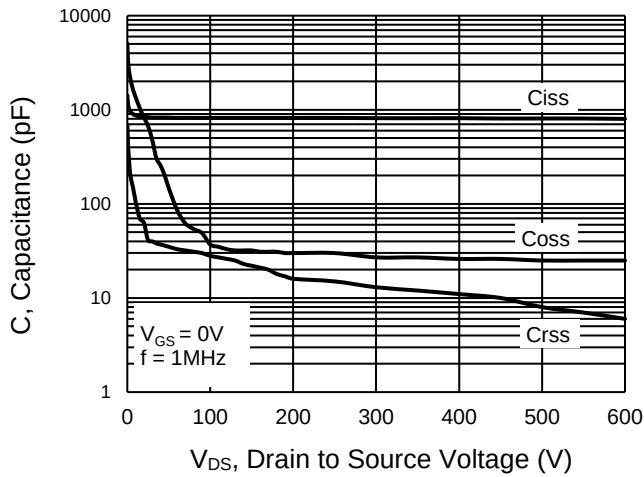
On-Resistance vs. Gate-Source Voltage



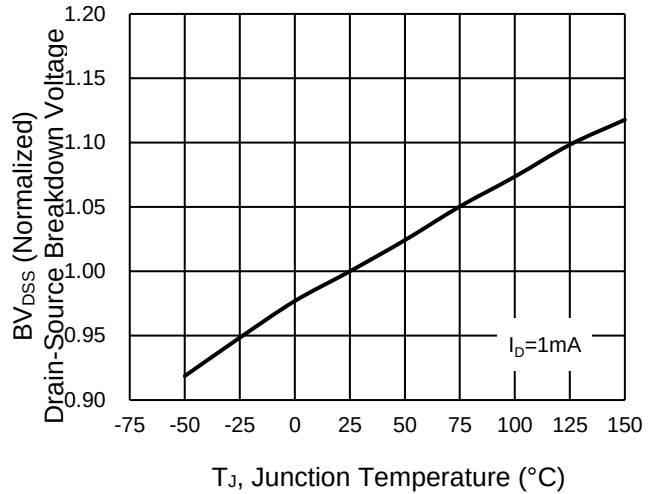
CHARACTERISTICS CURVES

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

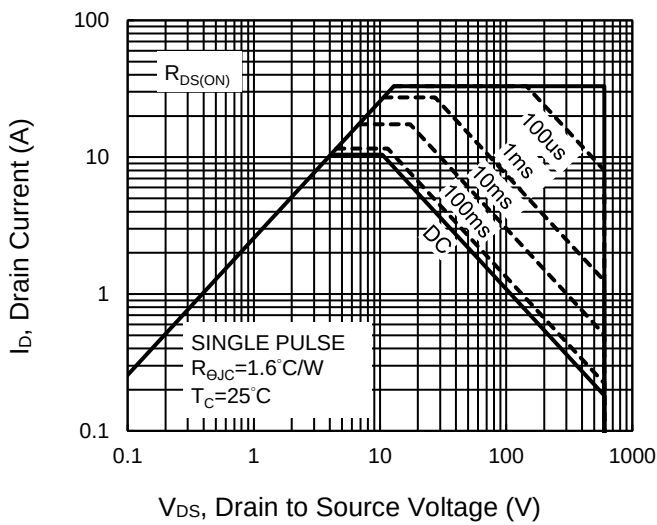
Capacitance vs. Drain-Source Voltage



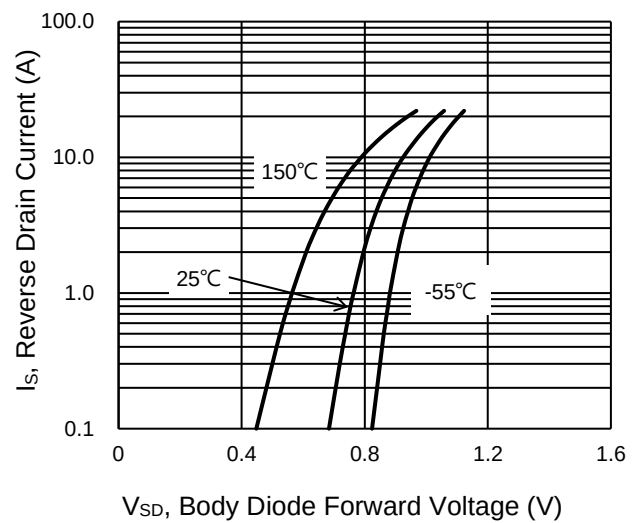
BV_{DSS} vs. Junction Temperature



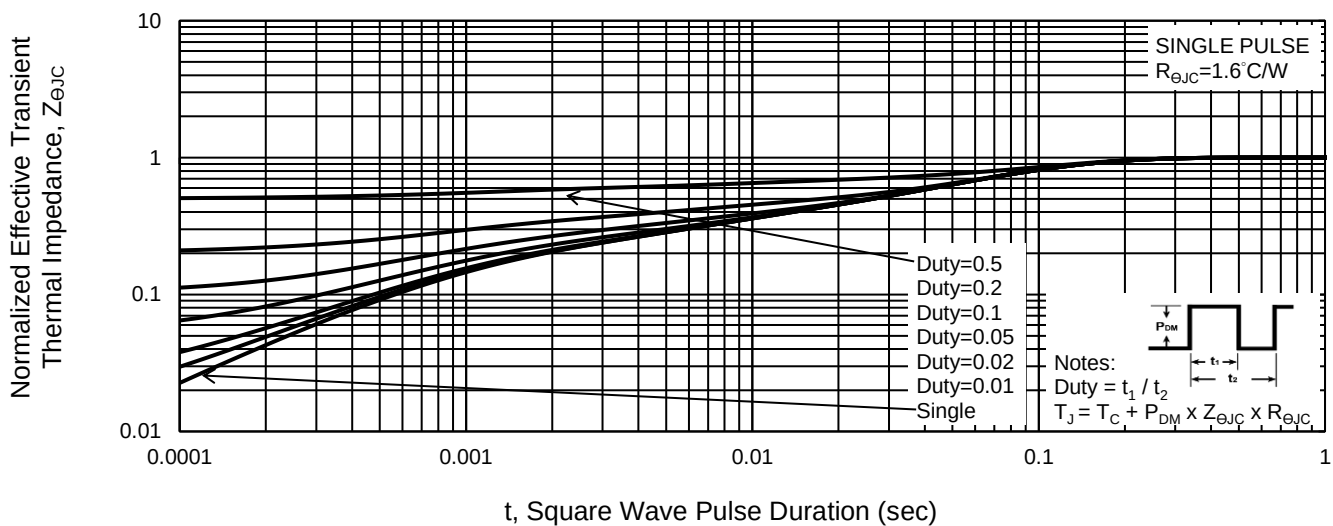
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

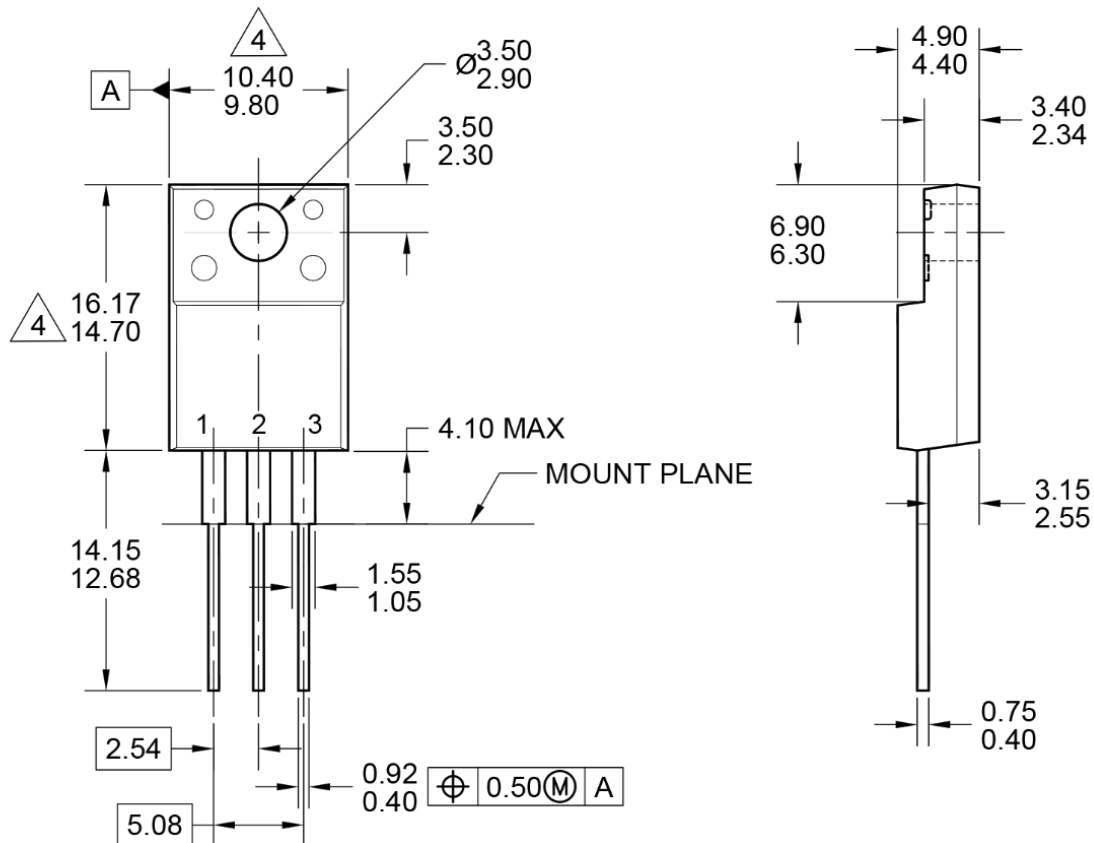


Normalized Thermal Transient Impedance, Junction-to-Case



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

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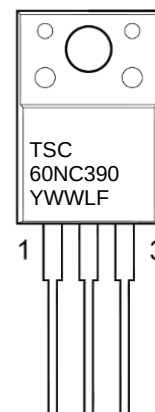


NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: EIAJ ED-7500A-1, SC-91.

4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREME OF THE PLASTIC BODY.

5. DWG NO. REF: HQ2SD07-ITO220-072 REV B.



MARKING DIAGRAM

- 60NC390 = Device marking
- Y = Year Code
- WW = Week Code (01~52)
- L = Lot Code (1~9,A~Z)
- F = Factory Code

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