

N-Channel Power MOSFET

600V, 18A, 0.19Ω

FEATURES

- Super-Junction technology
- High performance, small $R_{DS(on)} \cdot Q_g$ figure of merit (FOM)
- High ruggedness performance
- 100% UIS tested
- High commutation performance
- Pb-free plating
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
V_{DS}	600	V
$R_{DS(on)}$ (max)	0.19	Ω
Q_g	31	nC

APPLICATION

- Power Supply
- AC/DC LED Lighting



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		V_{GS}	±30	V
Continuous Drain Current (Note 1)	$T_C = 25^\circ\text{C}$	I_D	18	A
	$T_C = 100^\circ\text{C}$		10.8	A
Pulsed Drain Current (Note 2)		I_{DM}	54	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$		P_{DTOT}	33.8	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	212.9	mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	2.6	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	$R_{\theta JC}$	3.7	°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	°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 with minimum recommended footprint 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}	600	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	2.0	3.0	4.0	V
Gate Body Leakage	V _{GS} = ±30V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = 600V, V _{GS} = 0V	I _{DSS}	--	--	1	μA
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 6A	R _{DS(on)}	--	0.17	0.19	Ω
Dynamic ^(Note 5)						
Total Gate Charge	V _{DS} = 380V, I _D = 18A, V _{GS} = 10V	Q _g	--	31	--	nC
Gate-Source Charge		Q _{gs}	--	8	--	
Gate-Drain Charge		Q _{gd}	--	12.6	--	
Input Capacitance	V _{DS} = 100V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	1273	--	pF
Output Capacitance		C _{oss}	--	92	--	
Gate Resistance	F = 1MHz, open drain	R _g	--	3.1	--	Ω
Switching ^(Note 6)						
Turn-On Delay Time	V _{DD} = 380V, R _{GEN} = 25Ω, I _D = 18A, V _{GS} = 10V,	t _{d(on)}	--	36	--	ns
Turn-On Rise Time		t _r	--	21	--	
Turn-Off Delay Time		t _{d(off)}	--	95	--	
Turn-Off Fall Time		t _f	--	21	--	
Source-Drain Diode ^(Note 4)						
Forward On Voltage	I _S = 18A, V _{GS} = 0V	V _{SD}	--	--	1.4	V
Reverse Recovery Time	V _R =100V, I _S = 18A	t _{rr}	--	359.4	--	ns
Reverse Recovery Charge	dl _F /dt = 100A/μs	Q _{rr}	--	4.54	--	μC

Notes:

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3. $L = 63mH, I_{AS} = 2.6A, V_{DD} = 50V, R_G = 25\Omega$, 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.

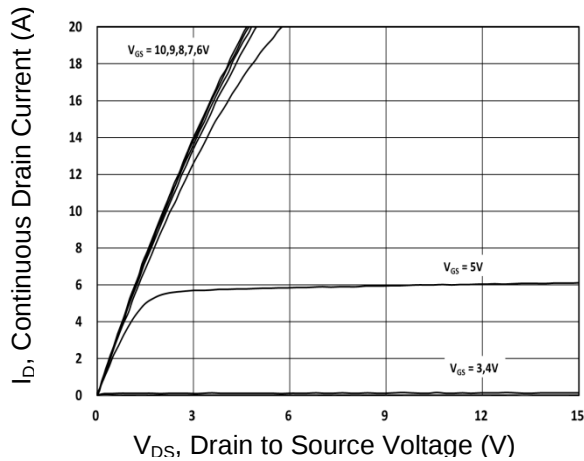
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM60NB190CI C0G	ITO-220	50pcs / Tube

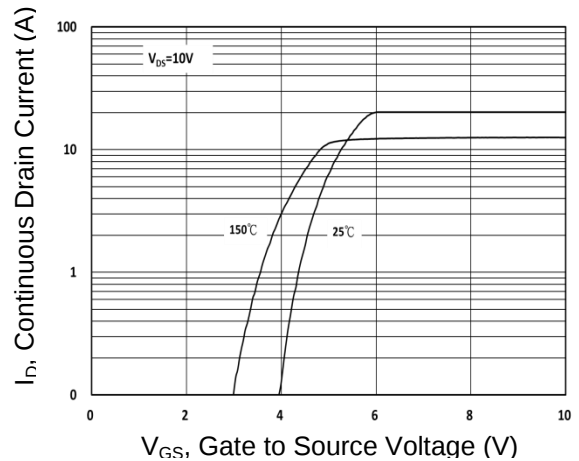
CHARACTERISTICS CURVES

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

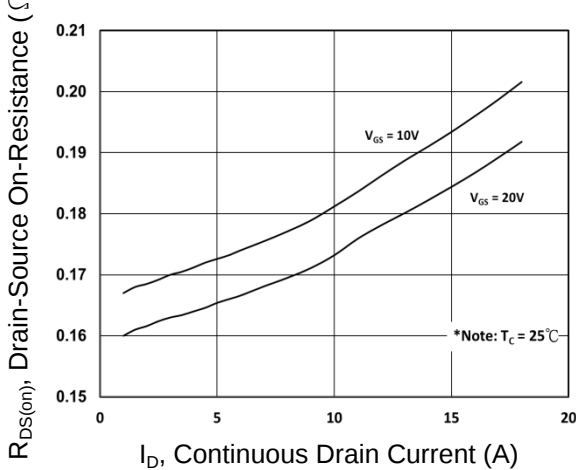
Output Characteristics



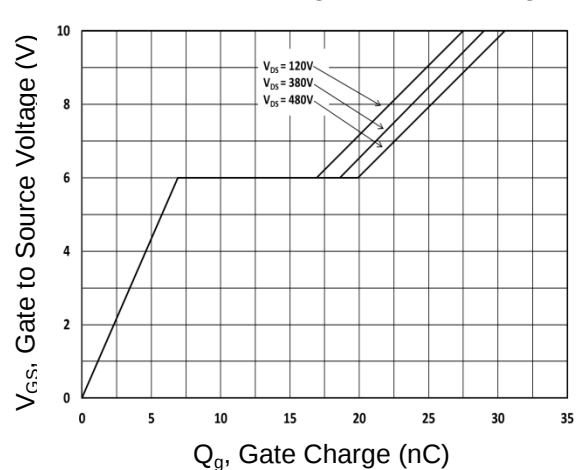
Transfer Characteristics



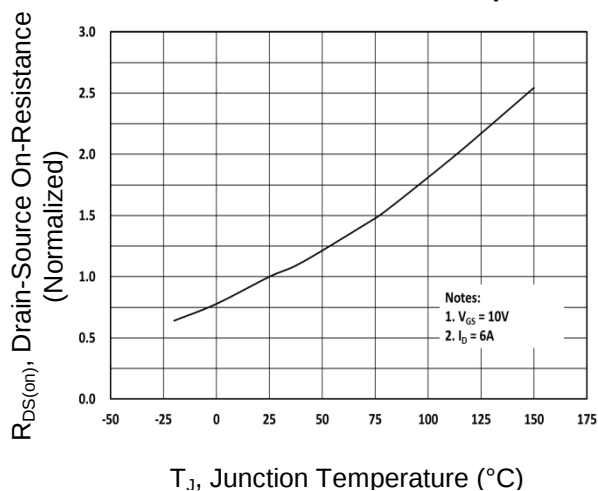
On-Resistance vs. Drain Current



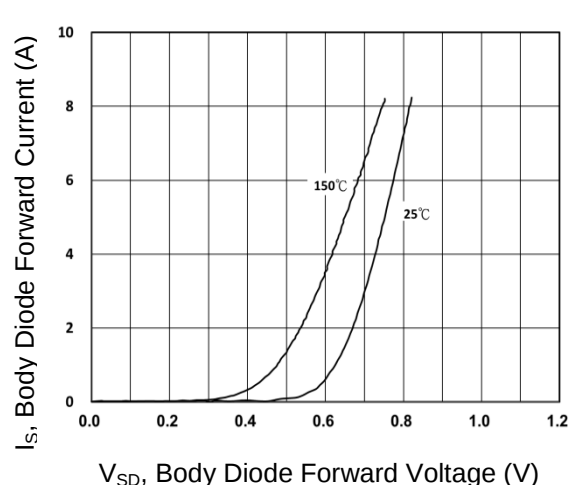
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



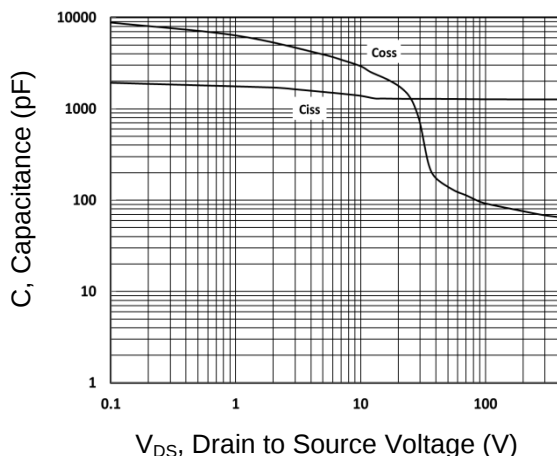
Source-Drain Diode Forward Current vs. Voltage



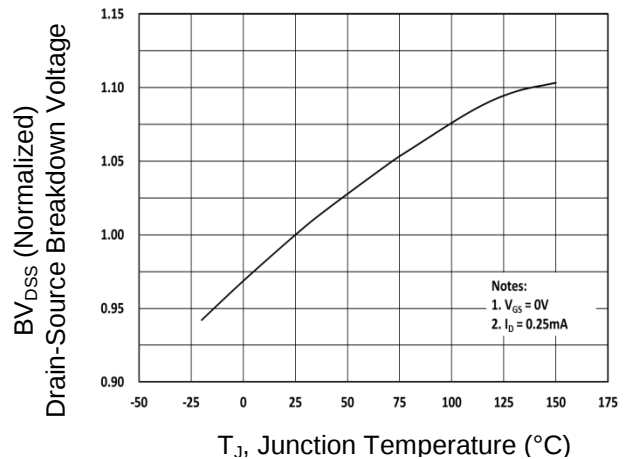
CHARACTERISTICS CURVES

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

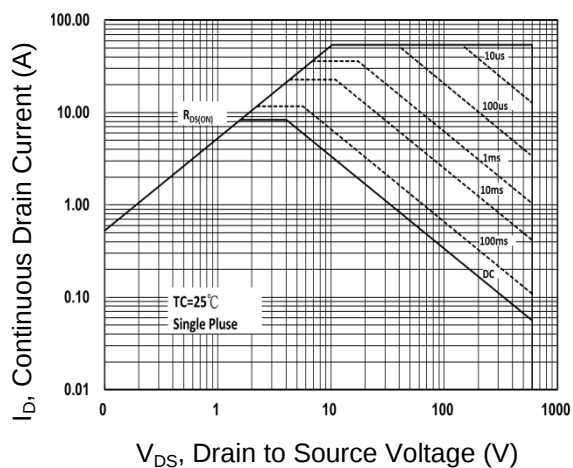
Capacitance vs. Drain-Source Voltage



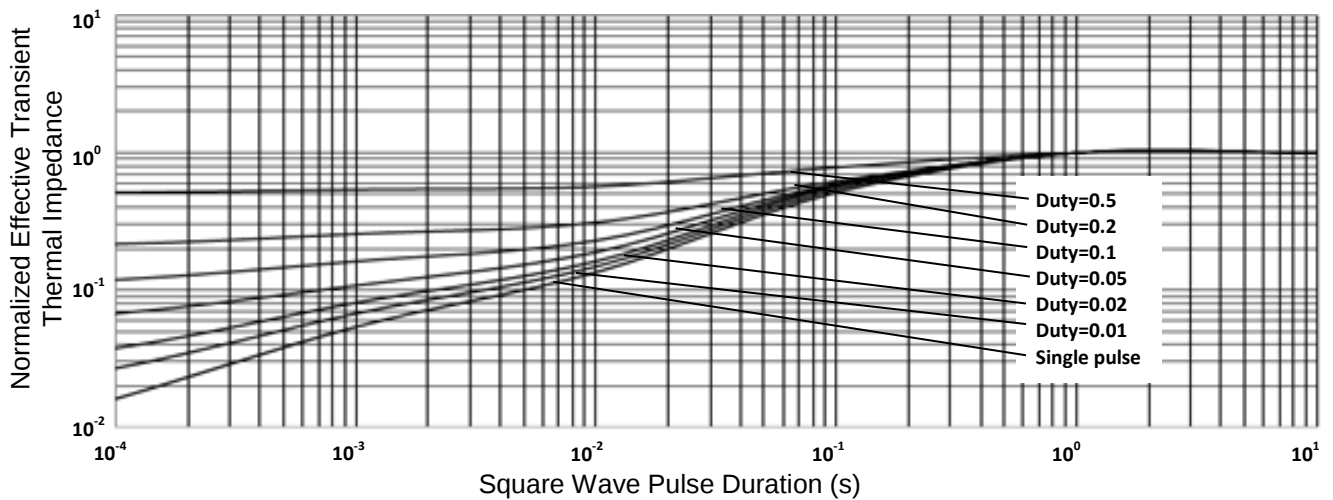
BV_{DSS} vs. Junction Temperature



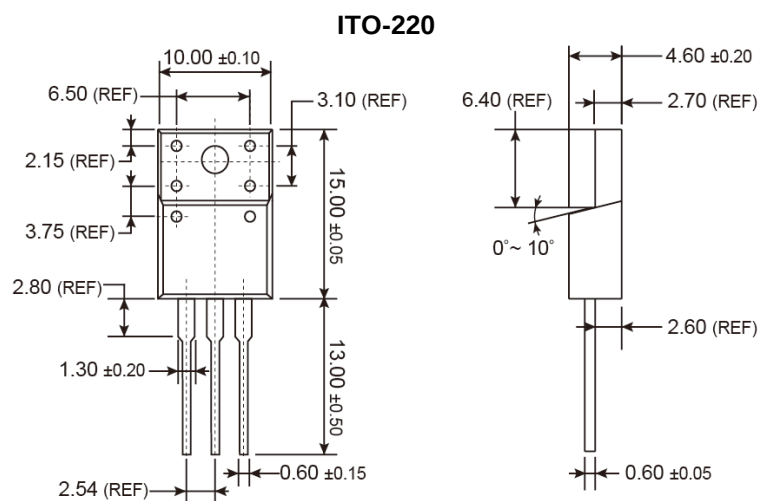
Maximum Safe Operating Area (ITO-220)



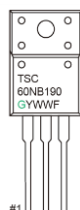
Normalized Thermal Transient Impedance, Junction-to-Case (ITO-220)



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



MARKING DIAGRAM



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

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