

N-Channel Power MOSFET

600V, 38A, 99mΩ

FEATURES

- Super-Junction technology
- High performance, small $R_{DS(on)} \cdot Q_g$ figure of merit (FOM)
- High ruggedness performance
- 100% UIS and R_g tested
- 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

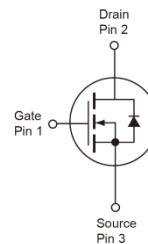
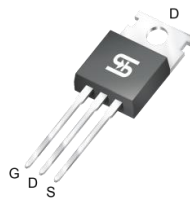
PARAMETER	VALUE	UNIT
V_{DS}	600	V
$R_{DS(on)}$ (max)	99	mΩ
Q_g	62	nC

APPLICATIONS

- PFC stage
- Server/Telecom Power
- Charging Station
- Inverter
- Power Supply



TO-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		V _{GS}	±30	V
Continuous Drain Current ^(Note 1)	T _C = 25°C	I _D	38	A
	T _C = 100°C		24	A
Pulsed Drain Current ^(Note 2)		I _{DM}	114	A
Total Power Dissipation @ T _C = 25°C		P _D	298	W
Single Pulse Avalanche Energy ^(Note 3)		E _{AS}	784	mJ
Single Pulse Avalanche Current ^(Note 3)		I _{AS}	5.6	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	$R_{\theta JC}$	0.42	$^\circ\text{C/W}$
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. 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}	600	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	2	3	4	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 (Note 4)	V _{GS} = 10V, I _D = 11.3A	R _{DS(on)}	--	86	99	mΩ
Dynamic (Note 5)						
Total Gate Charge	V _{DS} = 480V, I _D = 34A, V _{GS} = 10V	Q _g	--	62	--	nC
Gate-Source Charge		Q _{gs}	--	17	--	
Gate-Drain Charge		Q _{gd}	--	25	--	
Input Capacitance	V _{DS} = 100V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	2587	--	pF
Output Capacitance		C _{oss}	--	123	--	
Reverse Transfer Capacitance		C _{rss}	--	20	--	
Gate Resistance	f = 1.0MHz	R _g	--	3.3	6.6	Ω
Switching (Note 6)						
Turn-On Delay Time	V _{DD} = 300V, R _{GEN} = 5Ω, I _D = 17A, V _{GS} = 10V,	t _{d(on)}	--	18	--	ns
Turn-On Rise Time		t _r	--	24	--	
Turn-Off Delay Time		t _{d(off)}	--	87	--	
Turn-Off Fall Time		t _f	--	25	--	
Source-Drain Diode						
Body-Diode Continuous Forward Current		I _S	--	--	38	A
Body-Diode Pulsed Current		I _{SM}	--	--	114	A
Forward Voltage (Note 4)	I _S = 34A, V _{GS} = 0V	V _{SD}	--	--	1.4	V
Reverse Recovery Time	I _S = 17A	t _{rr}	--	342	--	ns
Reverse Recovery Charge	dl _F /dt = 100A/μs	Q _{rr}	--	5.3	--	μC

Notes:

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 50mH, I_{AS} = 5.6A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$.
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

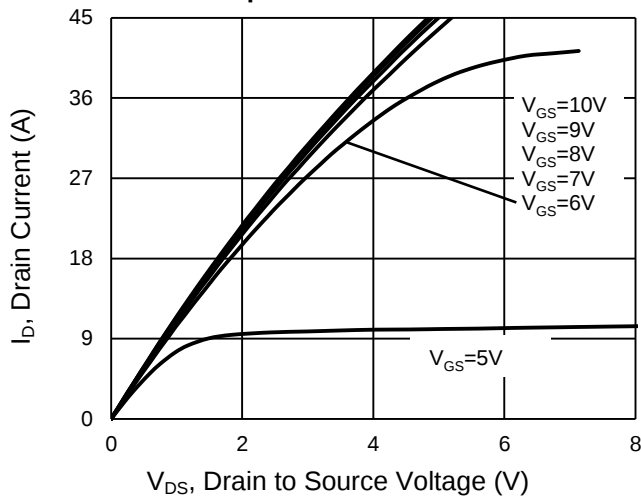
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM60NB099CZ C0G	TO-220	50pcs / Tube

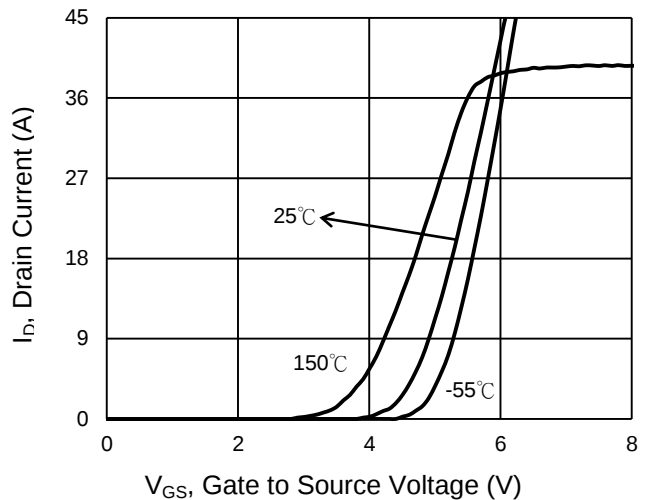
CHARACTERISTICS CURVES

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

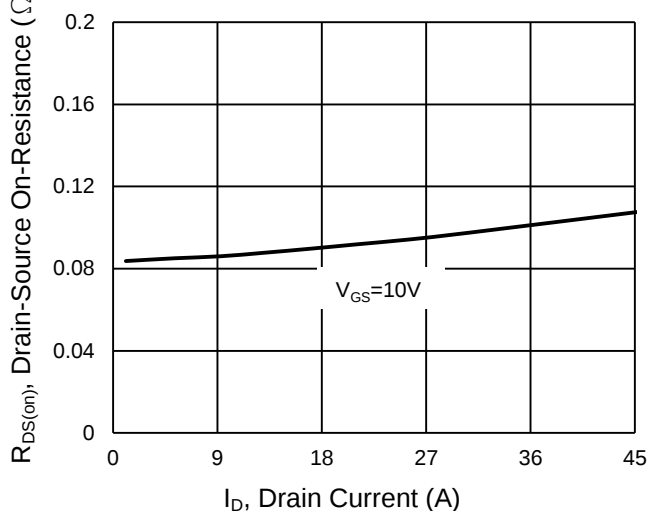
Output Characteristics



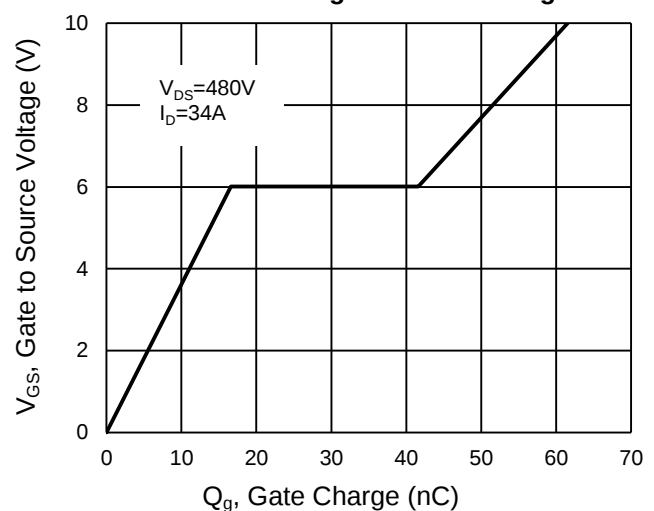
Transfer Characteristics



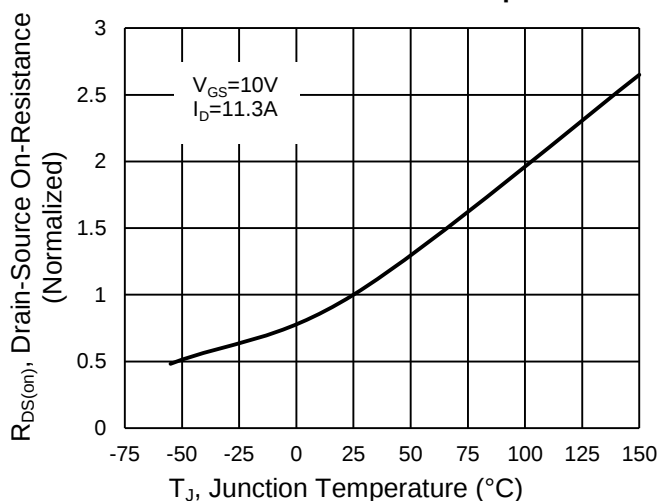
On-Resistance vs. Drain Current



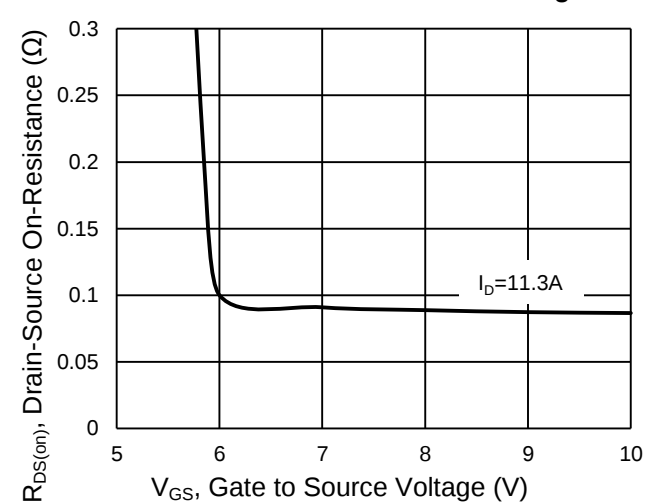
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



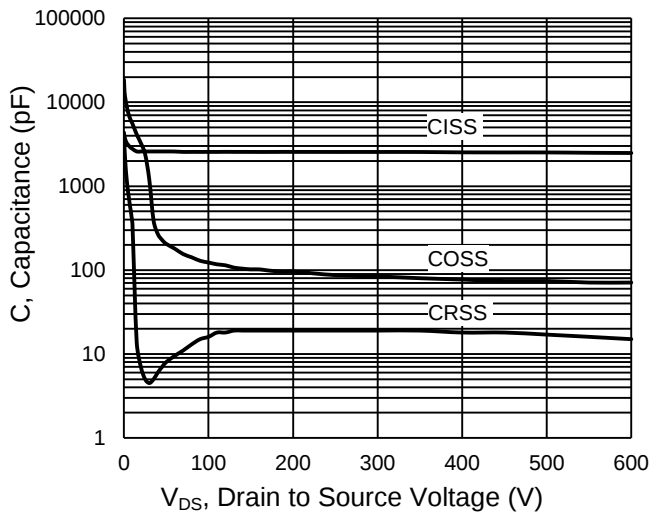
On-Resistance vs. Gate-Source Voltage



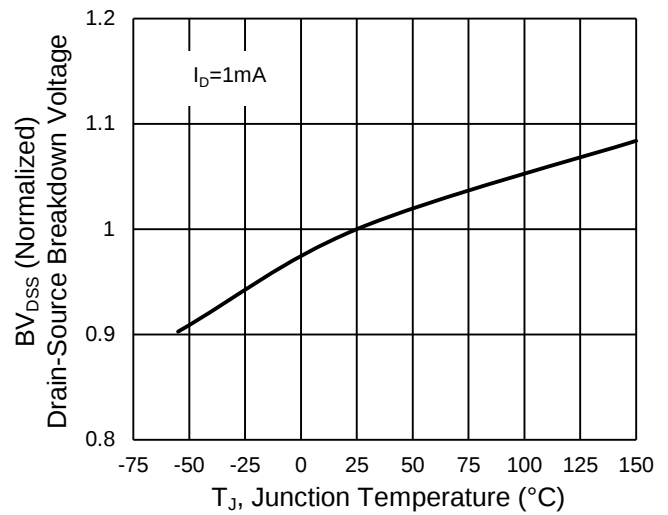
CHARACTERISTICS CURVES

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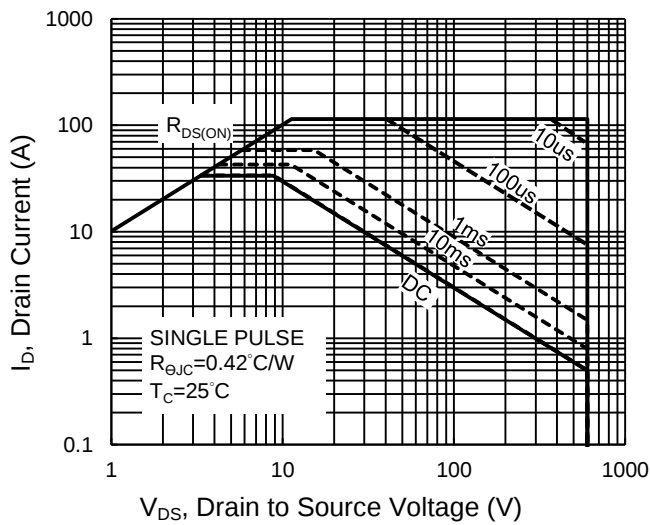
Capacitance vs. Drain-Source Voltage



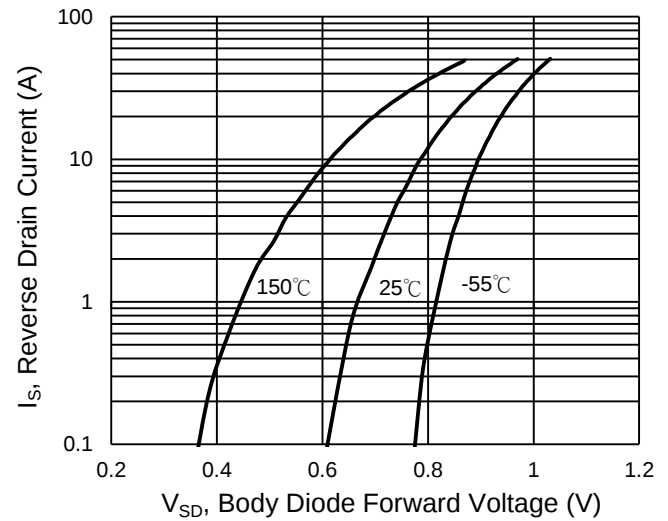
BV_{DSS} vs. Junction Temperature



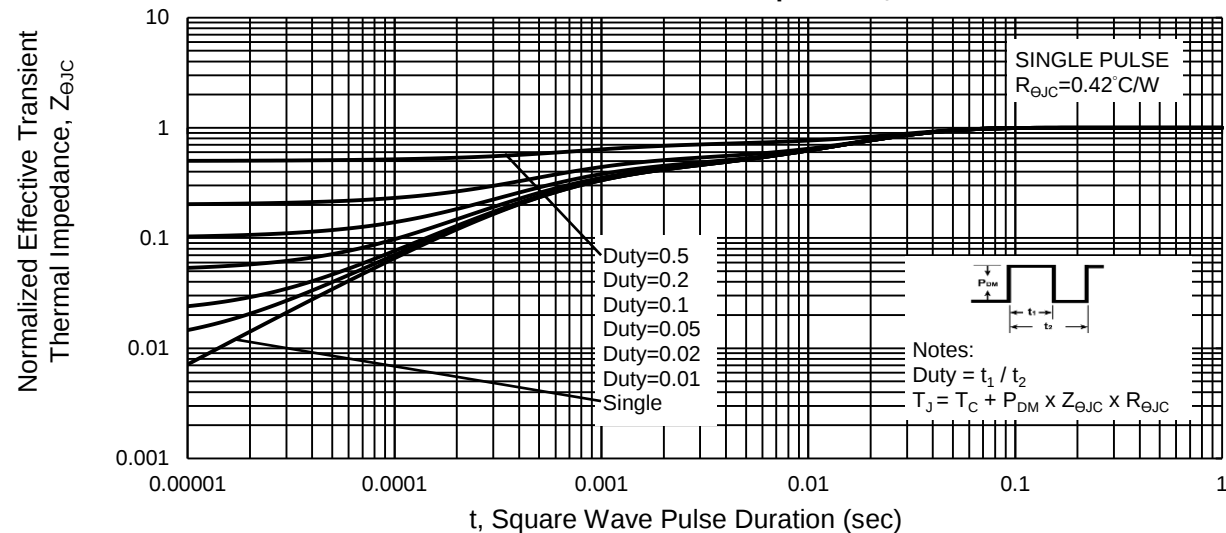
Maximum Safe Operating Area, Junction-to-Case



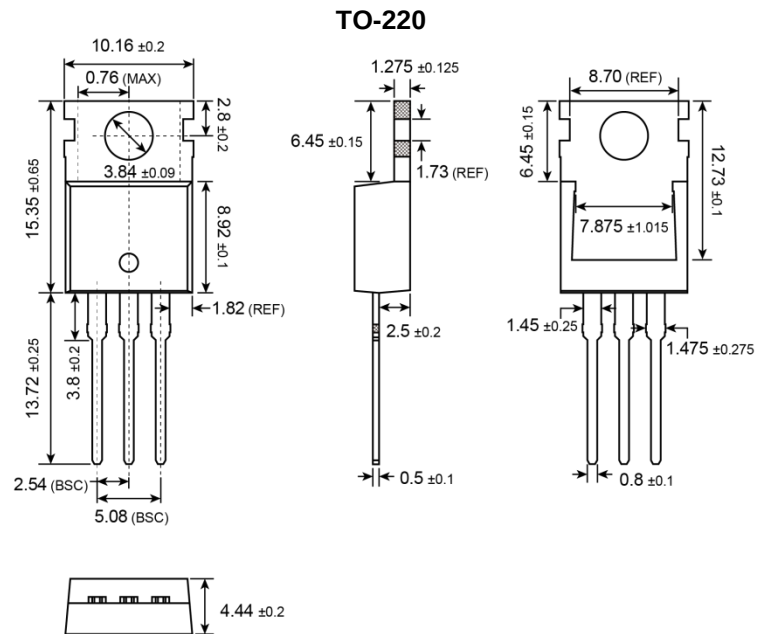
Source-Drain Diode Forward Current vs. Voltage



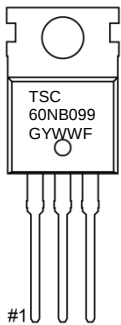
Normalized Thermal Transient Impedance, Junction-to-Case



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



MARKING DIAGRAM



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

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