N-Channel Power MOSFET

FEATURES

- Latest super-junction technology
- Low gate charge capacitance
- High gate noise immunity
- RoHS compliant
- Halogen-free

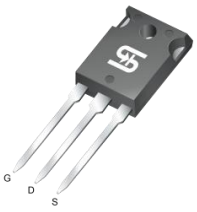
KEY PERFORMANCE PARAMETERS		
PARAMETER	**VALUE**	**UNIT**
V_{DS} @ $T_{j,max}$	650	V
$R_{DS(on)}$ (max)	48	mΩ
$Q_{g,typ}$	114	nC

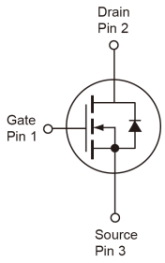
APPLICATIONS

- Switching applications
- HV motor driver
- Industrial

Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-247





ABSOLUTE MAXIMUM RATINGS (T_A = 25°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	T_C = 25°C	I_D	61	A
Pulsed Drain Current (Note 1)		I_{DM}	244	A
Total Power Dissipation @ T_C = 25°C		P_D	431	W
Single Pulse Avalanche Energy (Note 2)		E_{AS}	1012	mJ
Single Pulse Avalanche Current (Note 2)		I_{AS}	6.4	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	$R_{\Theta JC}$	0.29	°C/W
Junction to Ambient Thermal Resistance (Note 3)	$R_{\Theta JA}$	50	°C/W

Notes:

1. Pulse Width ≤ 100μs.
2. L = 50mH, R_G = 25Ω, Starting T_J = 25°C.
3. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. $R_{\Theta JA}$ is guaranteed by design while $R_{\Theta JA}$ 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 = 4.6mA	$V_{GS(TH)}$	4	4.7	6	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}	--	--	100	μA
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 20A	$R_{DS(on)}$	--	42	48	mΩ
	V_{GS} = 12V, I_D = 20A		--	40	44	
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 480V, I_D = 61A, V_{GS} = 10V	Q_g	--	114	--	nC
Gate-Source Charge		Q_{gs}	--	39	--	
Gate-Drain Charge		Q_{gd}	--	62	--	
Input Capacitance	V_{DS} = 300V, V_{GS} = 0V, f = 100kHz	C_{iss}	--	5023	--	pF
Output Capacitance		C_{oss}	--	129	--	
Reverse Transfer Capacitance		C_{rss}	--	14	--	
Gate Resistance	f = 1.0Hz	R_g	--	1.1	--	Ω
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 300V, R_G = 6.8Ω, I_D = 61A, V_{GS} = 10V	$t_{d(on)}$	--	74	--	ns
Turn-On Rise Time		t_r	--	45	--	
Turn-Off Delay Time		$t_{d(off)}$	--	95	--	
Turn-Off Fall Time		t_f	--	34	--	
Source-Drain Diode						
Forward Voltage (Note 4)	I_S = 20A, V_{GS} = 0V	V_{SD}	--	0.9	1.5	V
Reverse Recovery Time	I_S = 30.5A dI$_F$/dt = 100A/μs	t_{rr}	--	508	--	ns
Reverse Recovery Charge		Q_{rr}	--	12	--	μC

Notes:

4. Pulse test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.
5. Defined by design. Not subject to production test.
6. Switching time is essentially independent of operating temperature.

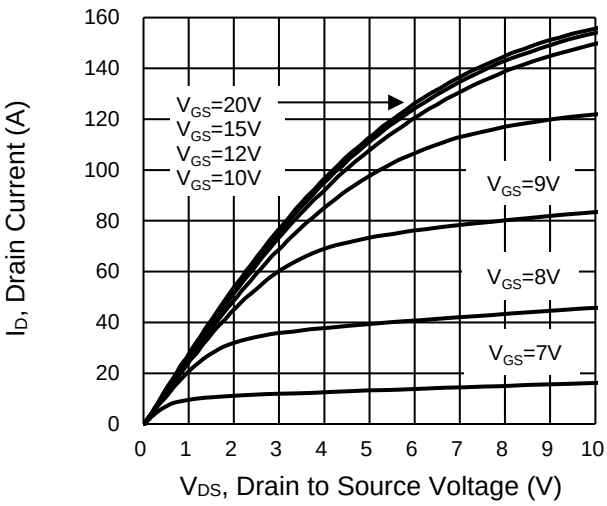
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM60NE048PW C0G	TO-247	30pcs / Tube

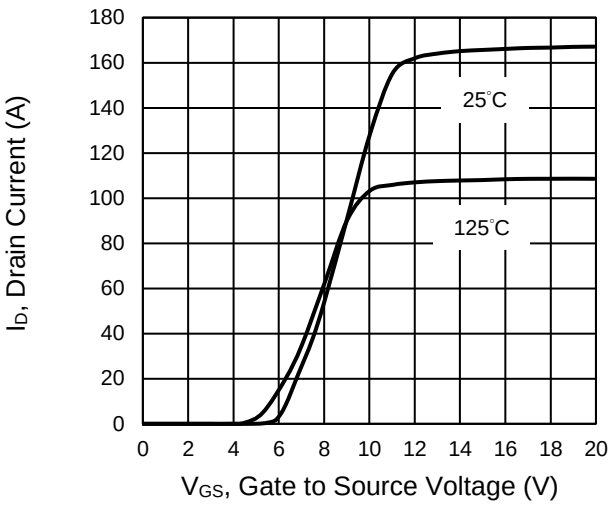
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

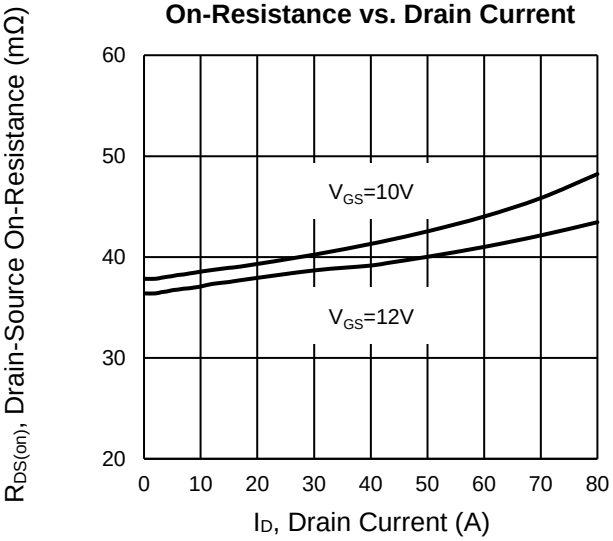
Output Characteristics



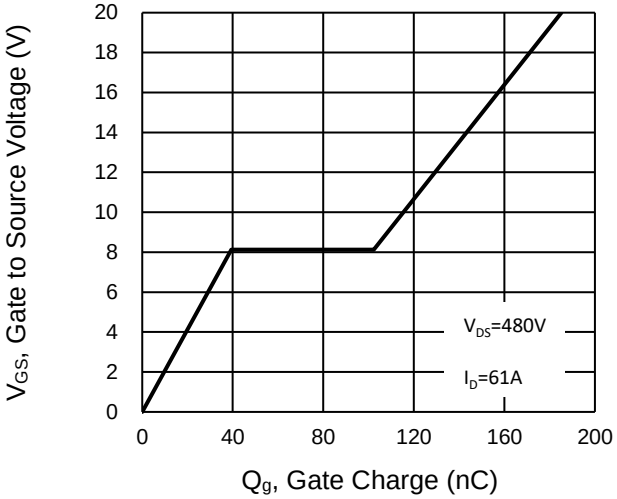
Transfer Characteristics



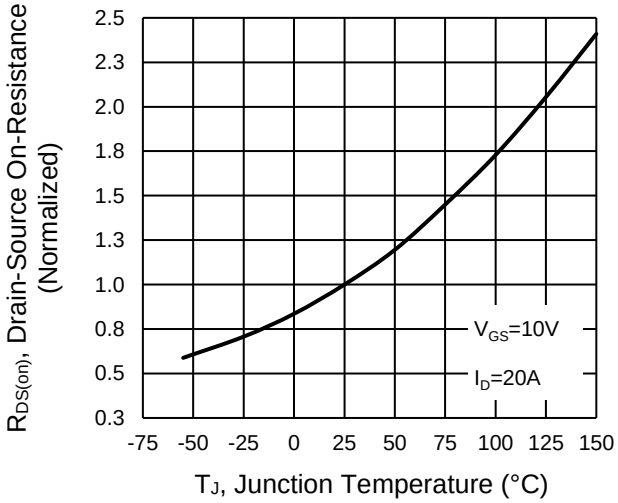
On-Resistance vs. Drain Current



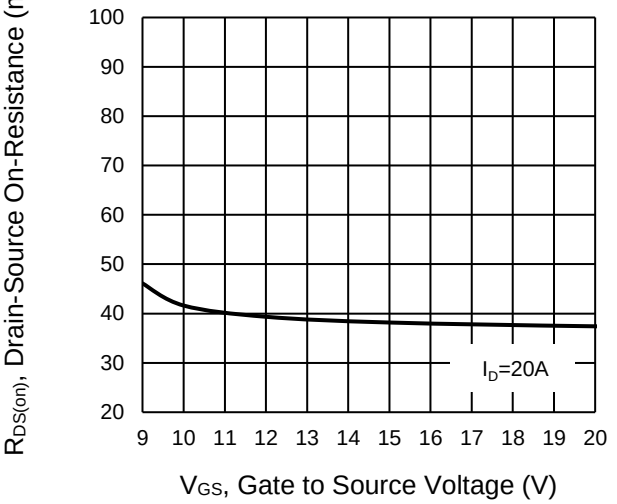
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



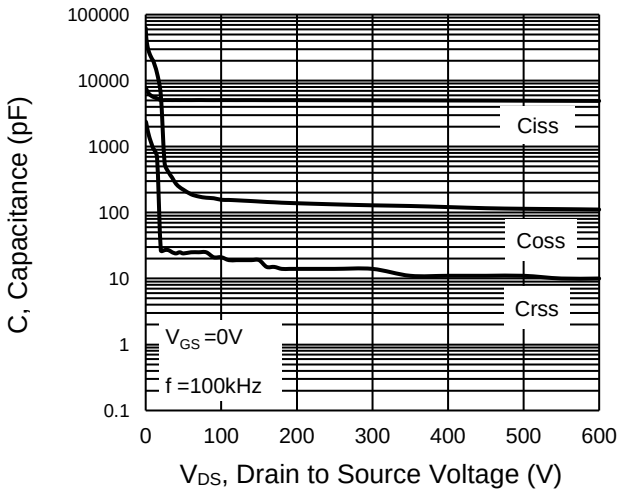
On-Resistance vs. Gate-Source Voltage



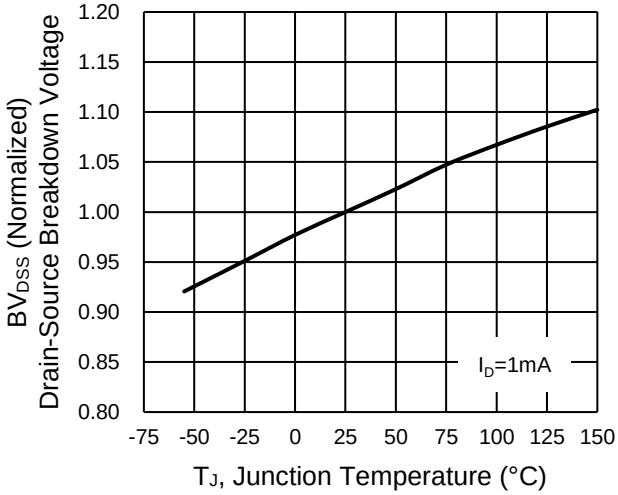
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

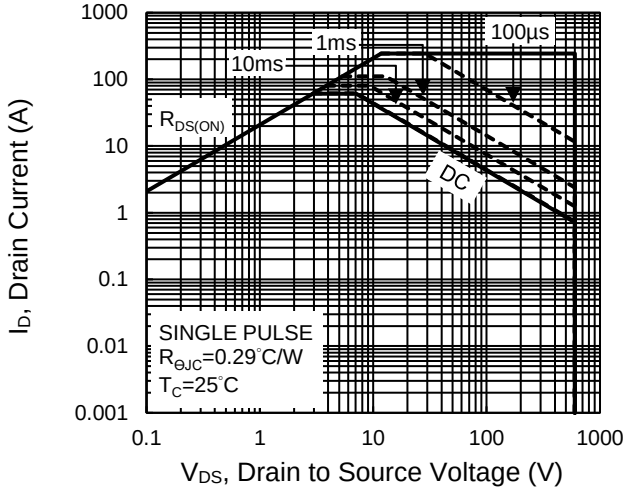
Capacitance vs. Drain-Source Voltage



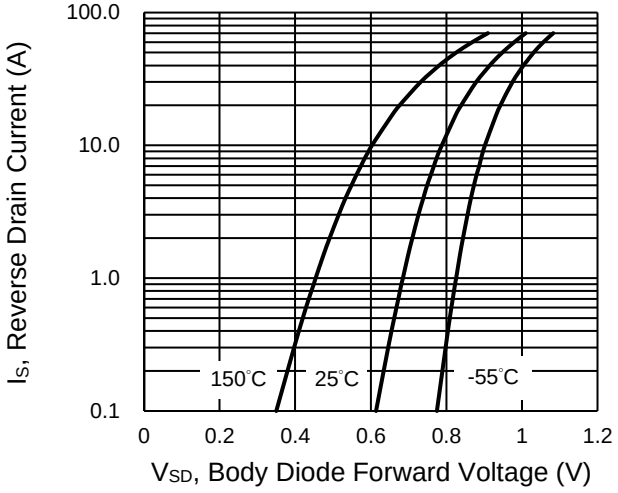
BV_{DSS} vs. Junction Temperature



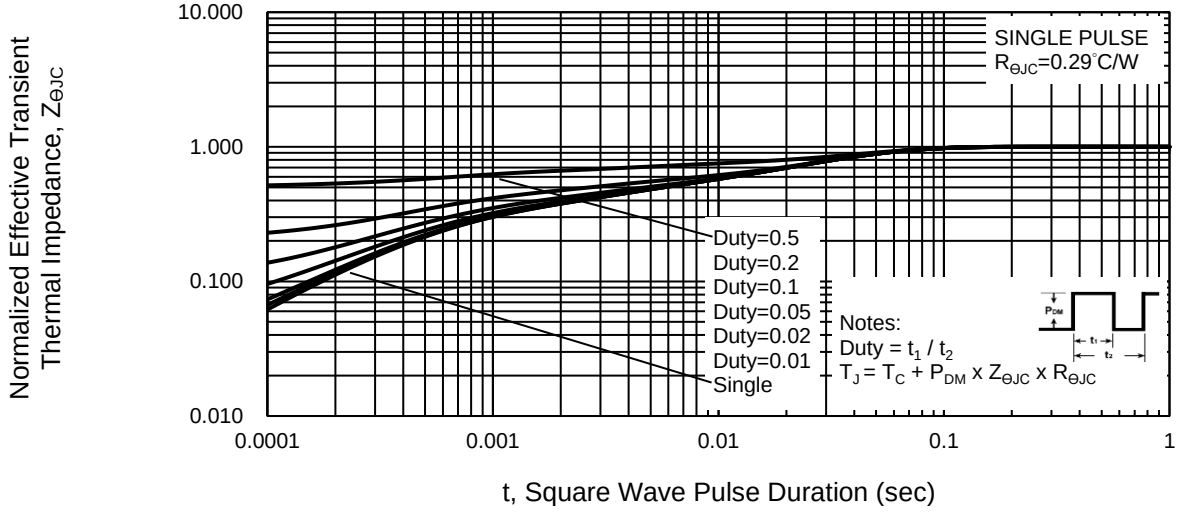
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage



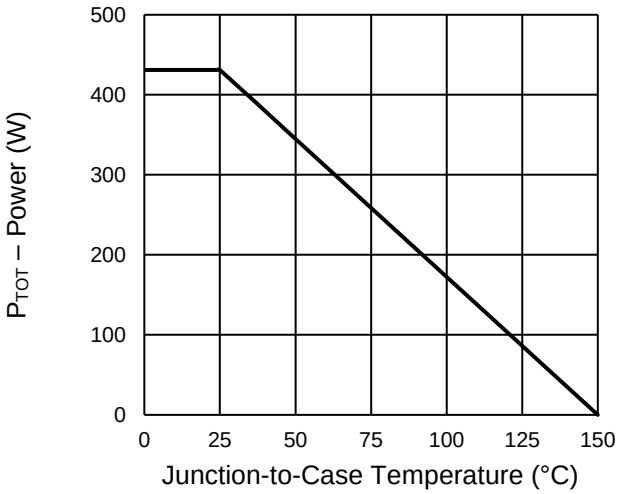
Normalized Thermal Transient Impedance, Junction-to-Case



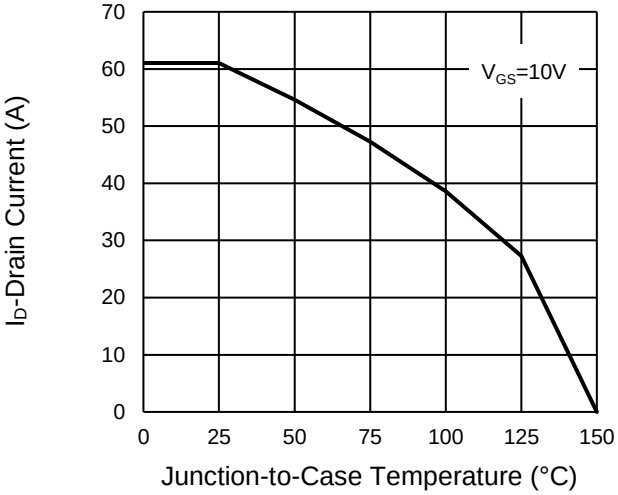
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

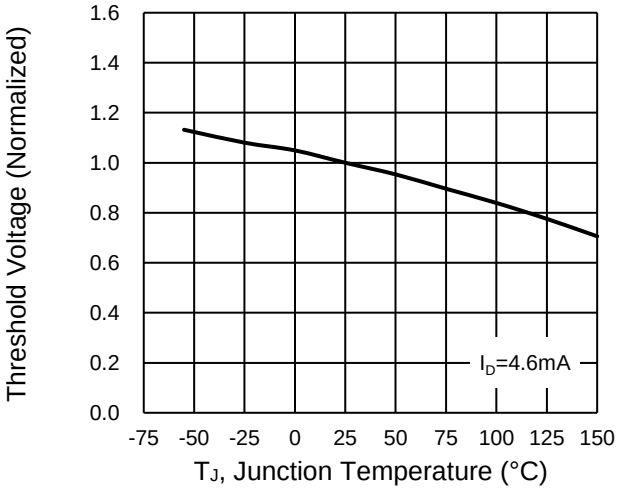
Power Dissipation



Drain Current

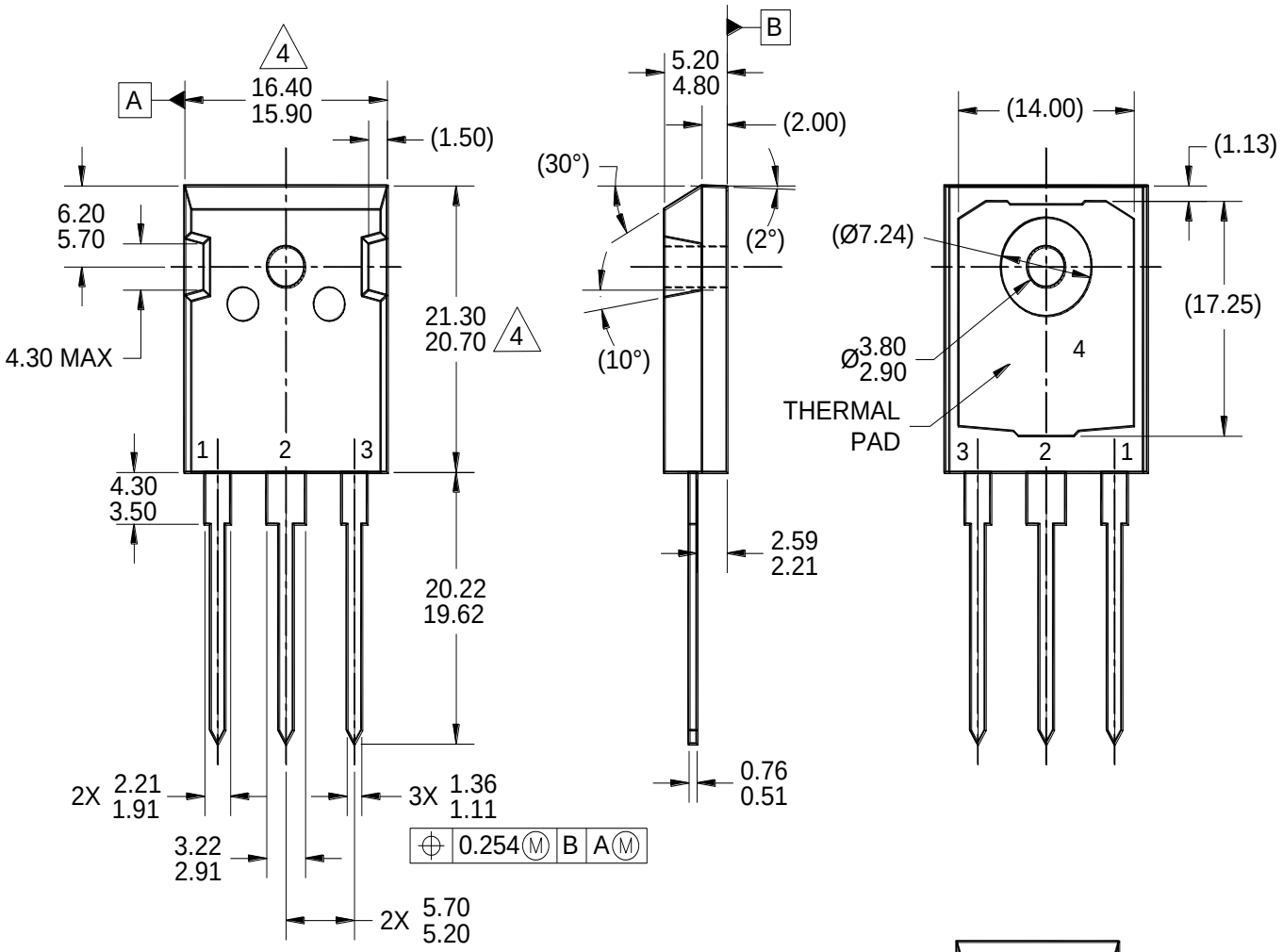


Normalized gate threshold voltage vs Temperature



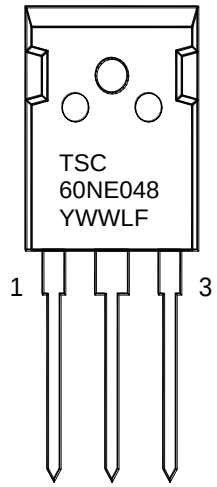
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-247



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEDEC TO-247, VARIATION AD, ISSUE E.
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-TO247AD-071 REV C.



MARKING DIAGRAM

Y	=	YEAR CODE
WW	=	WEEK CODE (01~52)
L	=	LOT CODE (1~9, A~Z)
F	=	FACTORY CODE

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