

N-Channel Power MOSFET

FEATURES

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

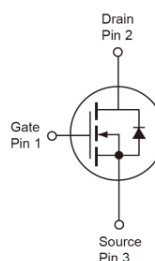
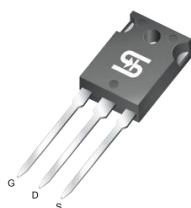
KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(on)} (max)$	84	mΩ
$Q_{g,typ}$	68	nC

APPLICATIONS

- Switching applications
- HV motor driver
- Industrial



TO-247



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	I_D	42	A
Pulsed Drain Current (Note 1)	I_{DM}	168	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	357	W
Single Pulse Avalanche Energy (Note 2)	E_{AS}	612	mJ
Single Pulse Avalanche Current (Note 2)	I_{AS}	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	$R_{\theta JC}$	0.35	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance (Note 3)	$R_{\theta JA}$	50	$^\circ\text{C/W}$

Notes:

1. Pulse Width $\leq 100\mu\text{s}$.
2. $L = 50\text{mH}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.
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 ($T_A = 25^\circ\text{C}$ 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	$V_{DS} = V_{GS}, I_D = 2.9mA$	$V_{GS(TH)}$	4	4.7	6	V
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	I_{DSS}	--	--	100	μA
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 14A$	$R_{DS(on)}$	--	71	84	m Ω
	$V_{GS} = 12V, I_D = 14A$		--	68	80	
Dynamic (Note 5)						
Total Gate Charge	$V_{DS} = 480V, I_D = 42A,$ $V_{GS} = 10V$	Q_g	--	68	--	nC
Gate-Source Charge		Q_{gs}	--	23	--	
Gate-Drain Charge		Q_{gd}	--	37	--	
Input Capacitance	$V_{DS} = 300V, V_{GS} = 0V,$ $f = 100kHz$	C_{iss}	--	2939	--	pF
Output Capacitance		C_{oss}	--	81	--	
Reverse Transfer Capacitance		C_{rss}	--	6	--	
Gate Resistance	$f = 1.0Hz$	R_g	--	0.9	--	Ω
Switching (Note 6)						
Turn-On Delay Time	$V_{DD} = 300V, R_G = 3.3\Omega,$ $I_D = 42A, V_{GS} = 10V$	$t_{d(on)}$	--	44	--	ns
Turn-On Rise Time		t_r	--	68	--	
Turn-Off Delay Time		$t_{d(off)}$	--	66	--	
Turn-Off Fall Time		t_f	--	41	--	
Source-Drain Diode						
Forward Voltage (Note 4)	$I_S = 14A, V_{GS} = 0V$	V_{SD}	--	0.9	1.5	V
Reverse Recovery Time	$I_S = 21A$	t_{rr}	--	438	--	ns
Reverse Recovery Charge	$dI_F/dt = 100A/\mu s$	Q_{rr}	--	9	--	μC

Notes:

- Pulse test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- Defined by design. Not subject to production test.
- Switching time is essentially independent of operating temperature.

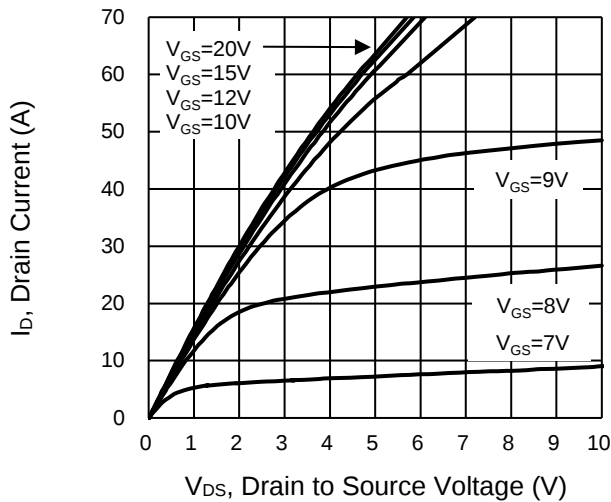
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM60NE084PW C0G	TO-247	30pcs / Tube

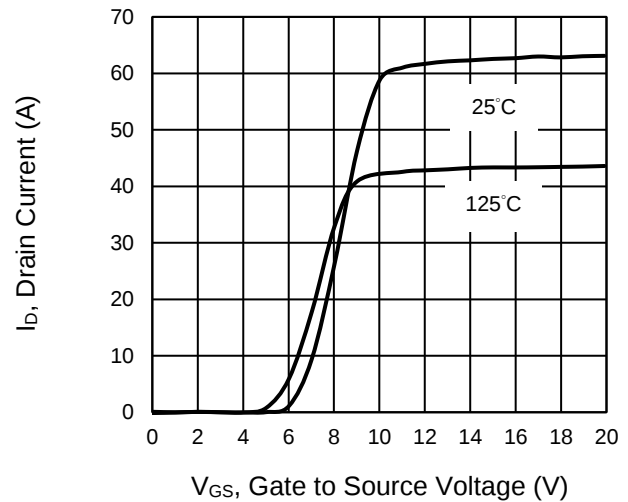
CHARACTERISTICS CURVES

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

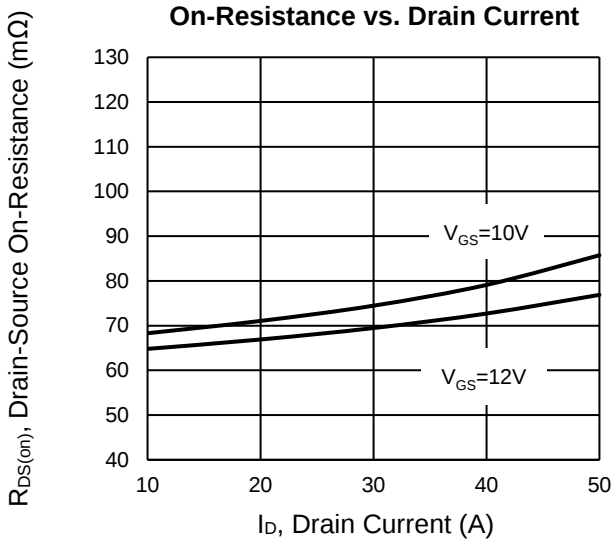
Output Characteristics



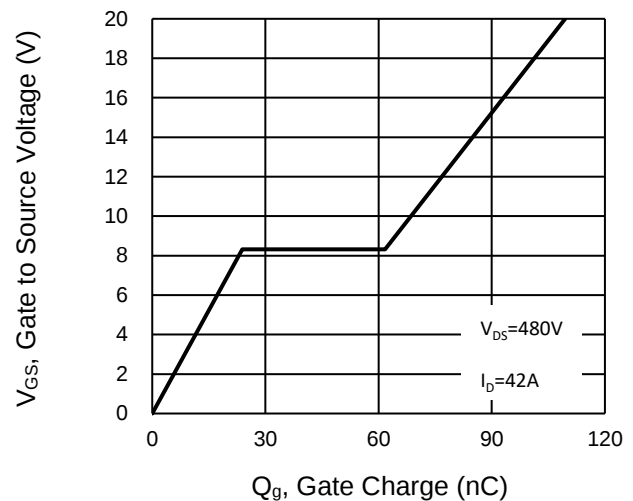
Transfer Characteristics



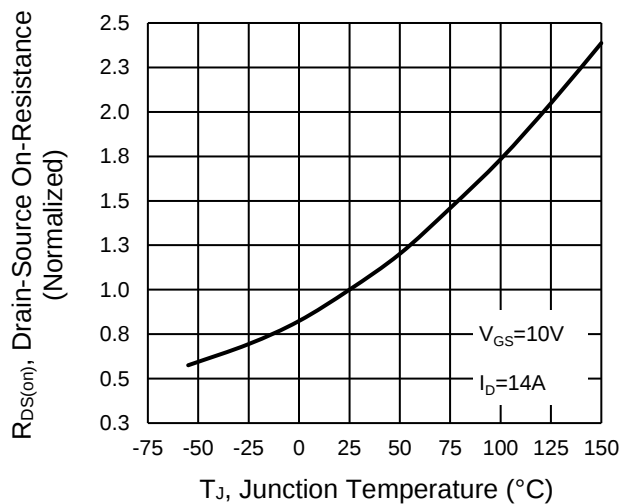
On-Resistance vs. Drain Current



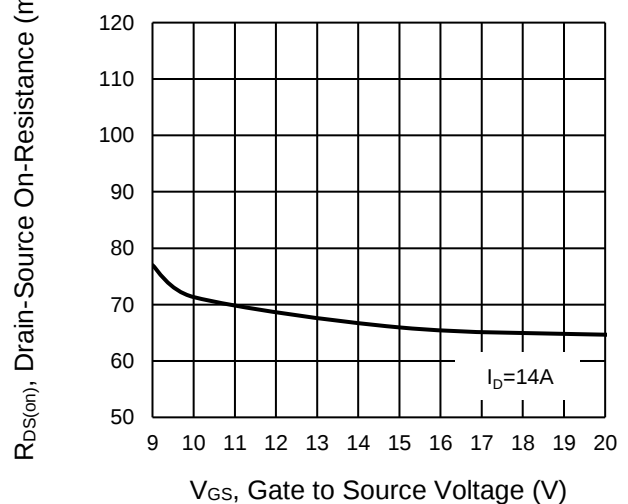
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



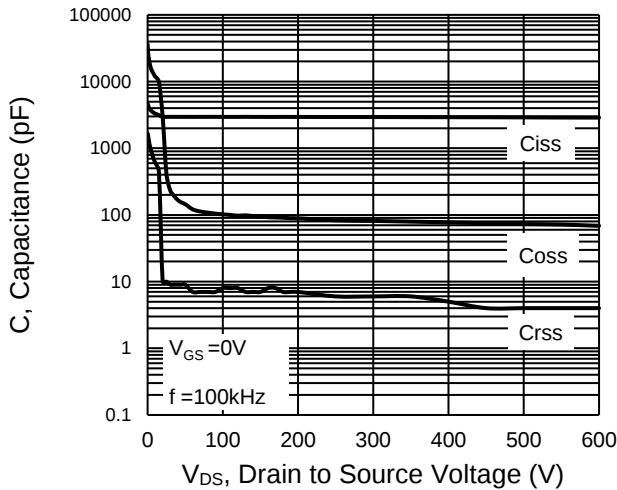
On-Resistance vs. Gate-Source Voltage



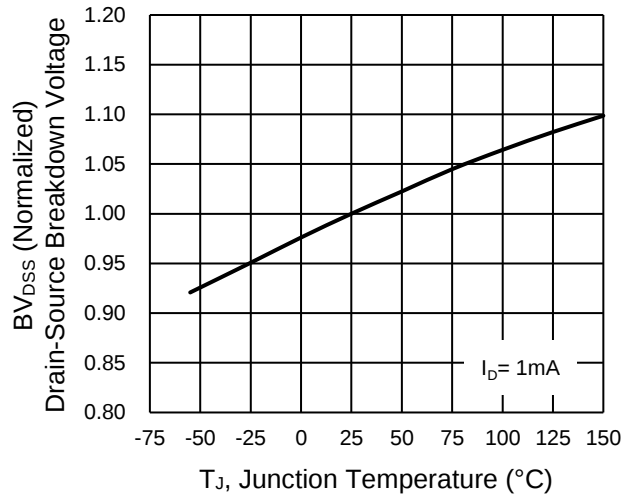
CHARACTERISTICS CURVES

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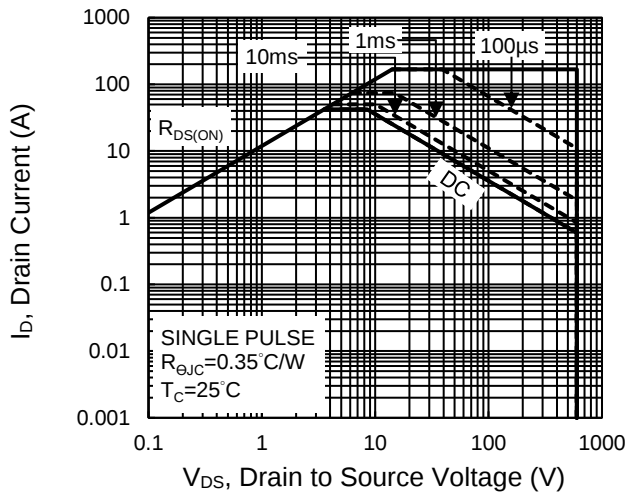
Capacitance vs. Drain-Source Voltage



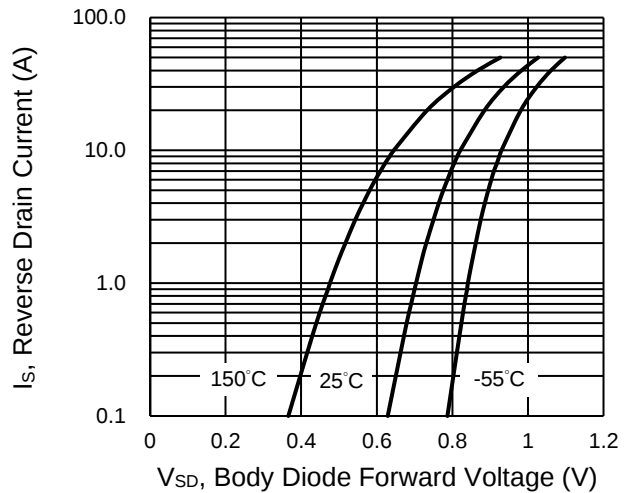
BV_{DSS} vs. Junction Temperature



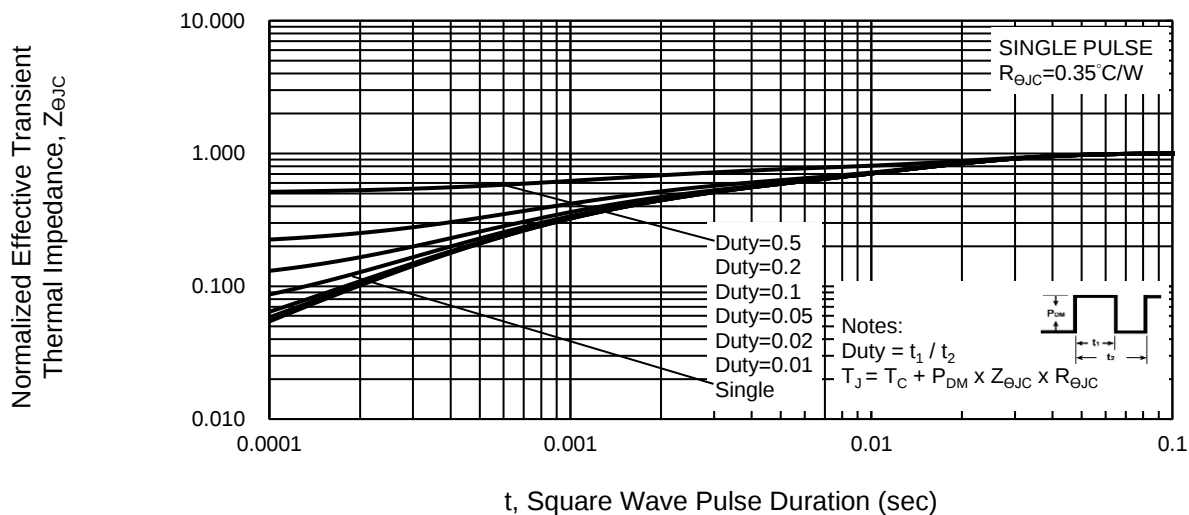
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

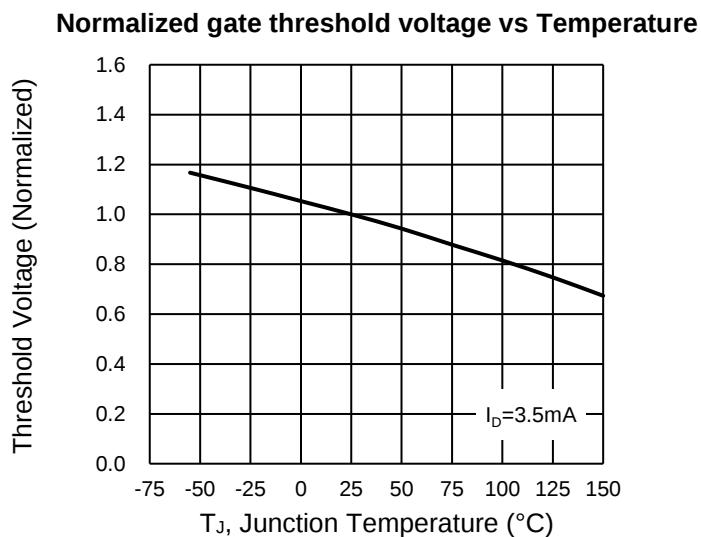
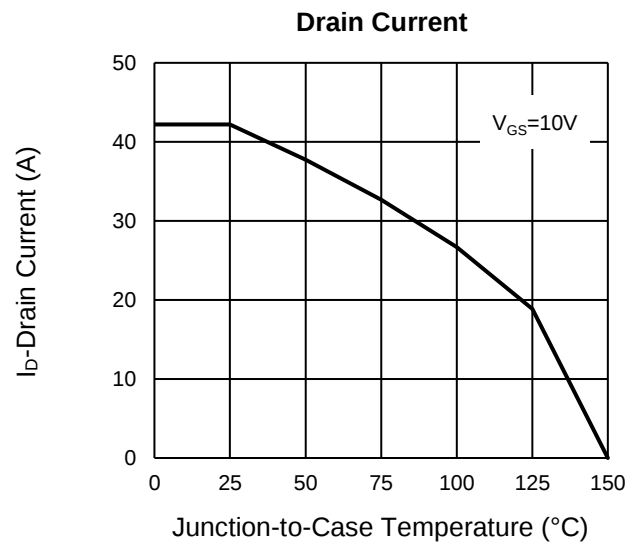
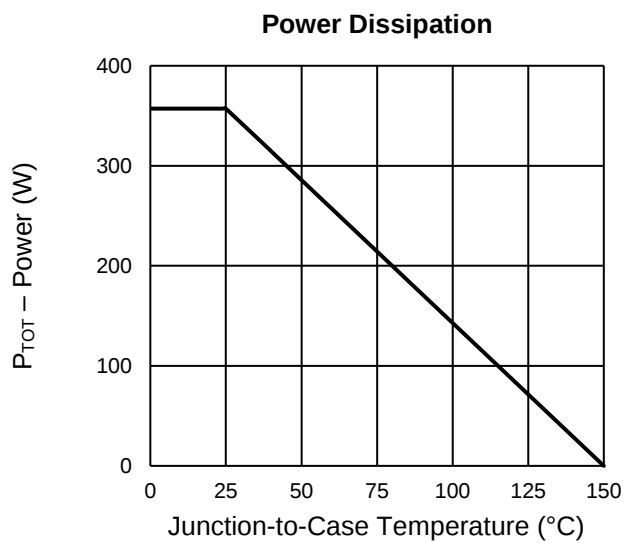


Normalized Thermal Transient Impedance, Junction-to-Case



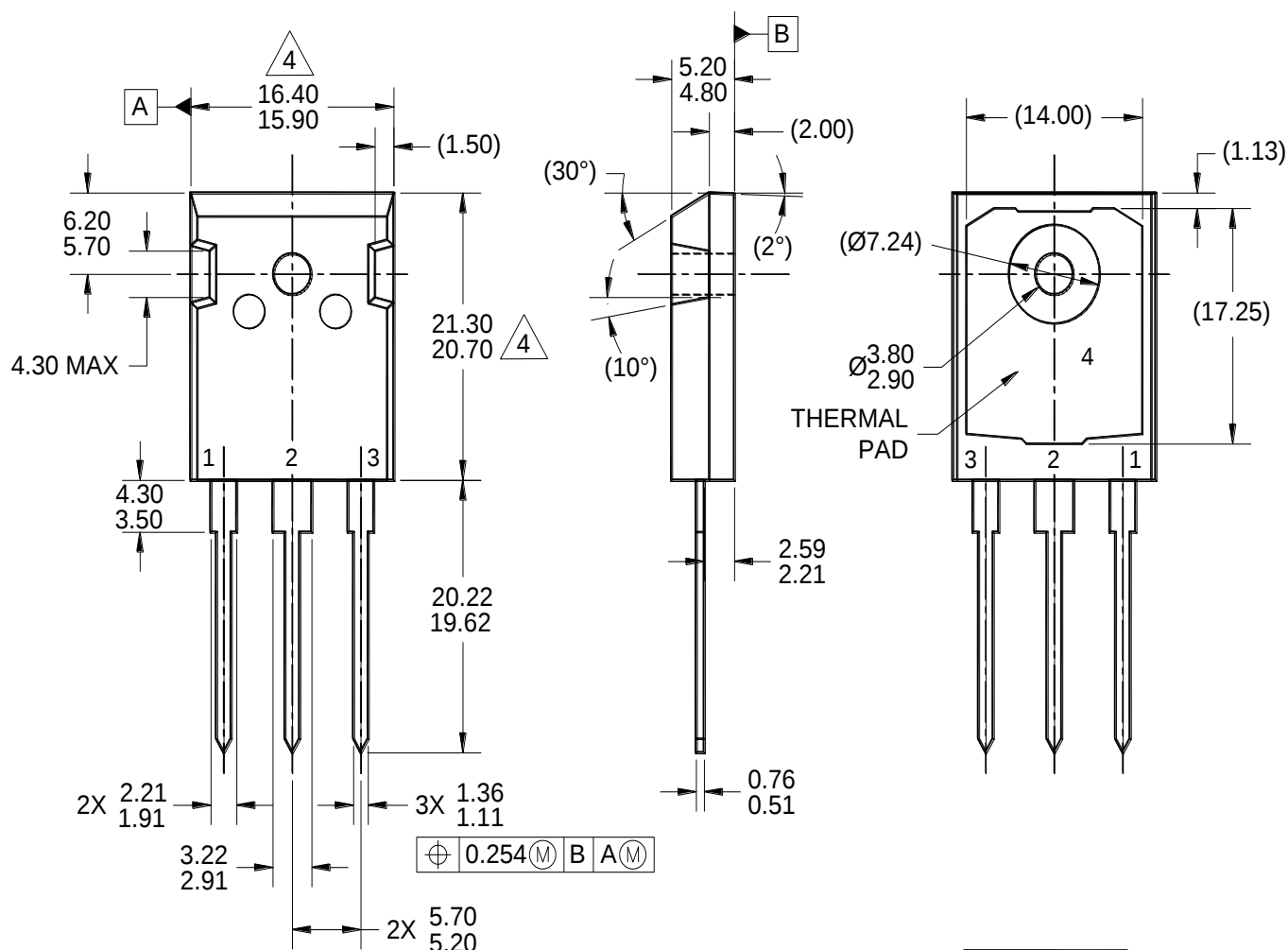
CHARACTERISTICS CURVES

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PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-247

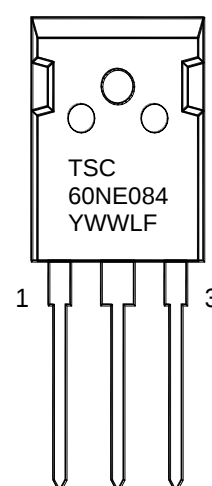


NOTES: UNLESS OTHERWISE SPECIFIED

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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