N-Channel Power MOSFET

60V, 38A, 17mΩ

FEATURES

- 100% avalanche tested
- Suitable for 5V drive applications
- Pb-free plating
- RoHS Compliant
- Halogen-Free according to IEC 61249-2-21

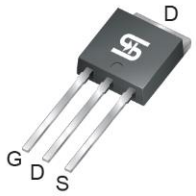
KEY PERFORMANCE PARAMETERS			
PARAMETER		**VALUE**	**UNIT**
V_{DS}		60	V
$R_{DS(on)}$ (max)	V_{GS} =10V	17	mΩ
	V_{GS} =4.5V	20	
Q_g		15	nC

APPLICATION

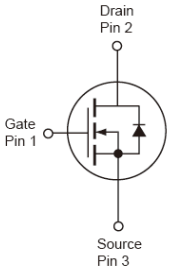
- SMPS Synchronous Rectification
- Networking DC-DC Power System

Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-251 (IPAK)



TO-251S (IPAK SL)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	38	A
	T_C = 100°C		24	
Pulsed Drain Current (Note 2)		I_{DM}	152	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	20	mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	20	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	46	W
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	$R_{\Theta JC}$	2.7	°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 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}	60	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	$V_{GS(TH)}$	1.2	1.7	2.5	V
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
	V_{DS} = 48V, V_{GS} = 0V, T_J = 125°C		--	--	10	
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 20A	$R_{DS(ON)}$	--	15	17	mΩ
	V_{GS} = 4.5V, I_D = 10A		--	17.5	20	
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 30V, I_D = 10A, V_{GS} = 4.5V	Q_g	--	15	--	nC
Gate-Source Charge		Q_{gs}	--	5.5	--	
Gate-Drain Charge		Q_{gd}	--	5	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	900	--	pF
Output Capacitance		C_{oss}	--	130	--	
Reverse Transfer Capacitance		C_{rss}	--	90	--	
Gate Resistance	F = 1MHz, open drain	R_g	--	2.2	--	Ω
Switching (Note 6)						
Turn-On Delay Time	V_{GS} = 10V, V_{DS} = 15V, R_G = 6Ω, I_D = 1A	$t_{d(on)}$	--	8.6	--	ns
Turn-On Rise Time		t_r	--	24.2	--	
Turn-Off Delay Time		$t_{d(off)}$	--	32.3	--	
Turn-Off Fall Time		t_f	--	7.9	--	
Source-Drain Diode (Note 4)						
Diode Forward Voltage	V_{GS}=0V, I_S=10A	V_{SD}	--	--	1	V
Reverse Recovery Time	V_{GS} = 0V, I_S = 10A, dI_F/dt = 100A/μs	t_{rr}	--	18	--	ns
Reverse Recovery Charge		Q_{rr}	--	10	--	nC

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 0.1mH, I_{AS} = 20A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

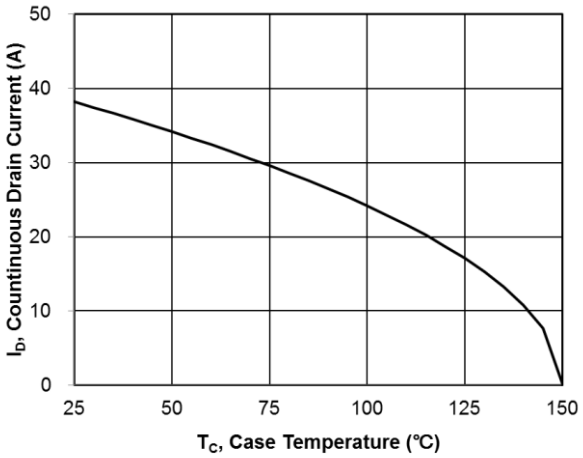
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM170N06CH C5G	TO-251(IPAK)	75pcs / Tube
TSM170N06CH X0G	TO-251S(IPAK SL)	75pcs / Tube

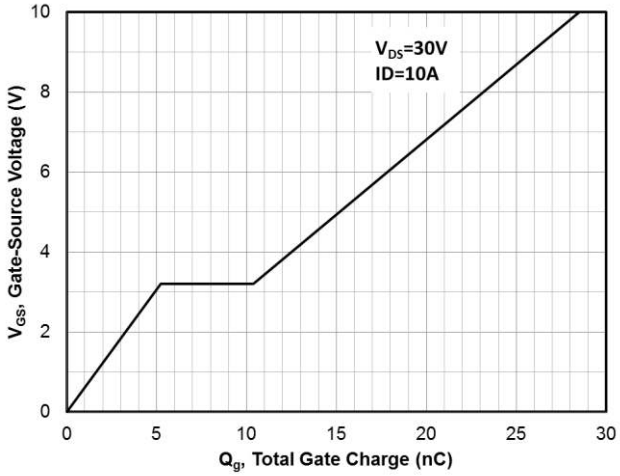
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

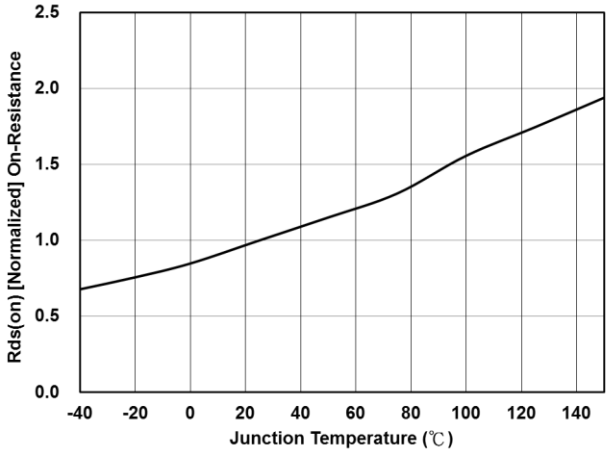
Continuous Drain Current vs. T_C



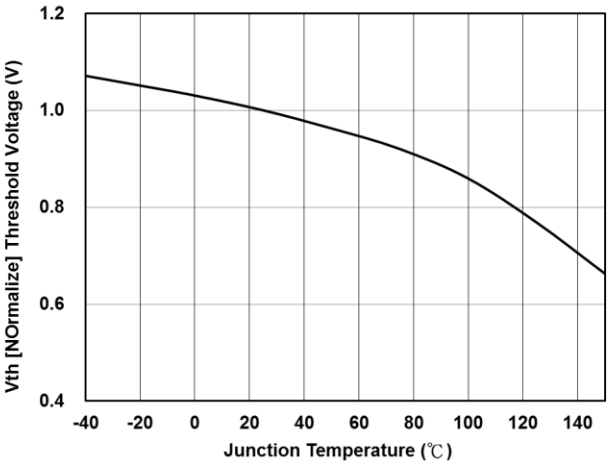
Gate Charge



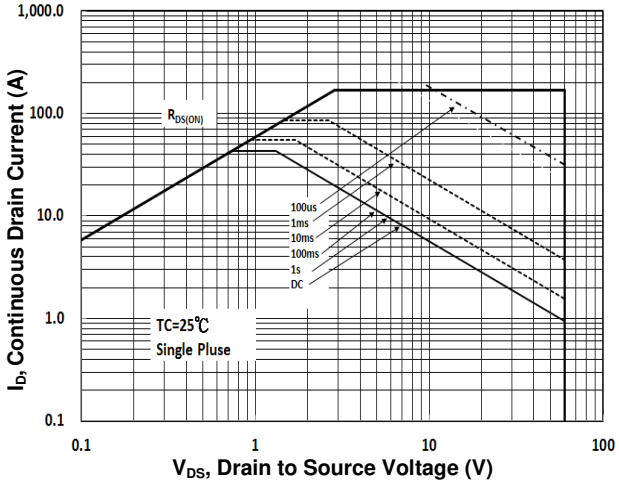
On-Resistance vs. Junction Temperature



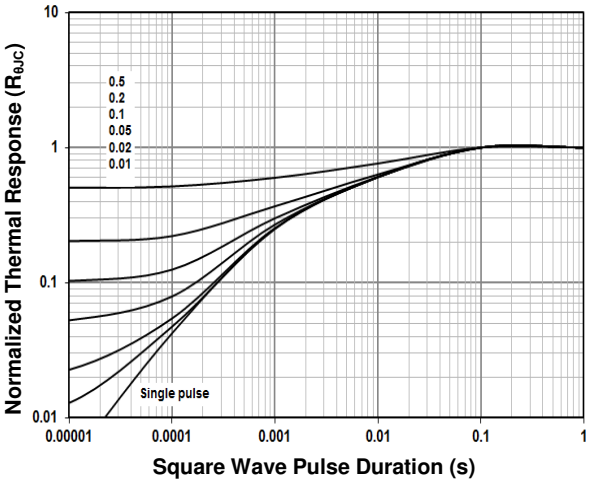
Threshold Voltage vs. Junction Temperature



Maximum Safe Operating Area

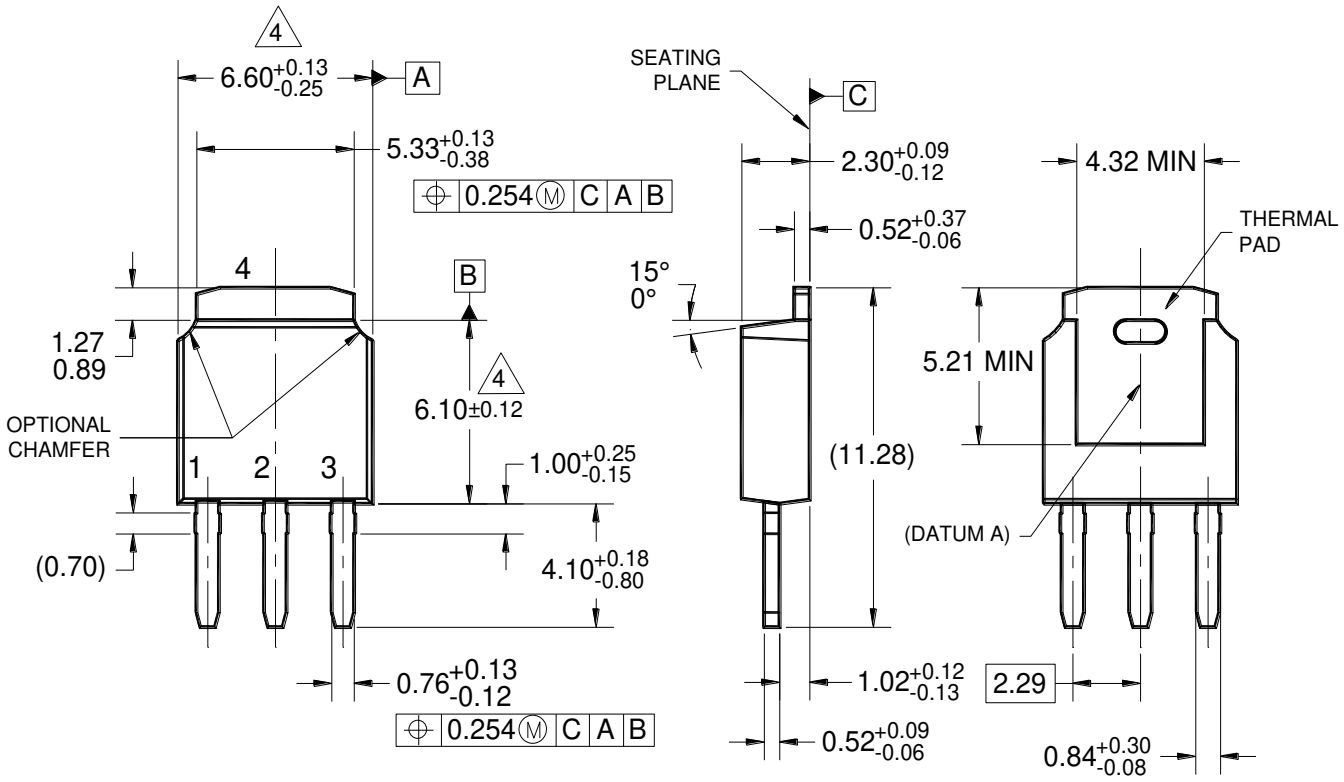


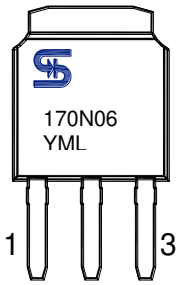
Normalized Thermal Transient Impedance Curve



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251S (IPAK SL)





MARKING DIAGRAM

P/N = MARKING CODE
Y = YEAR CODE
M = MONTH CODE FOR HALOGEN FREE PRODUCT

O =JAN	P =FEB	Q=MAR	R = APR
S =MAY	T =JUN	U=JUL	V = AUG
W =SEP	X =OCT	Y=NOV	Z = DEC

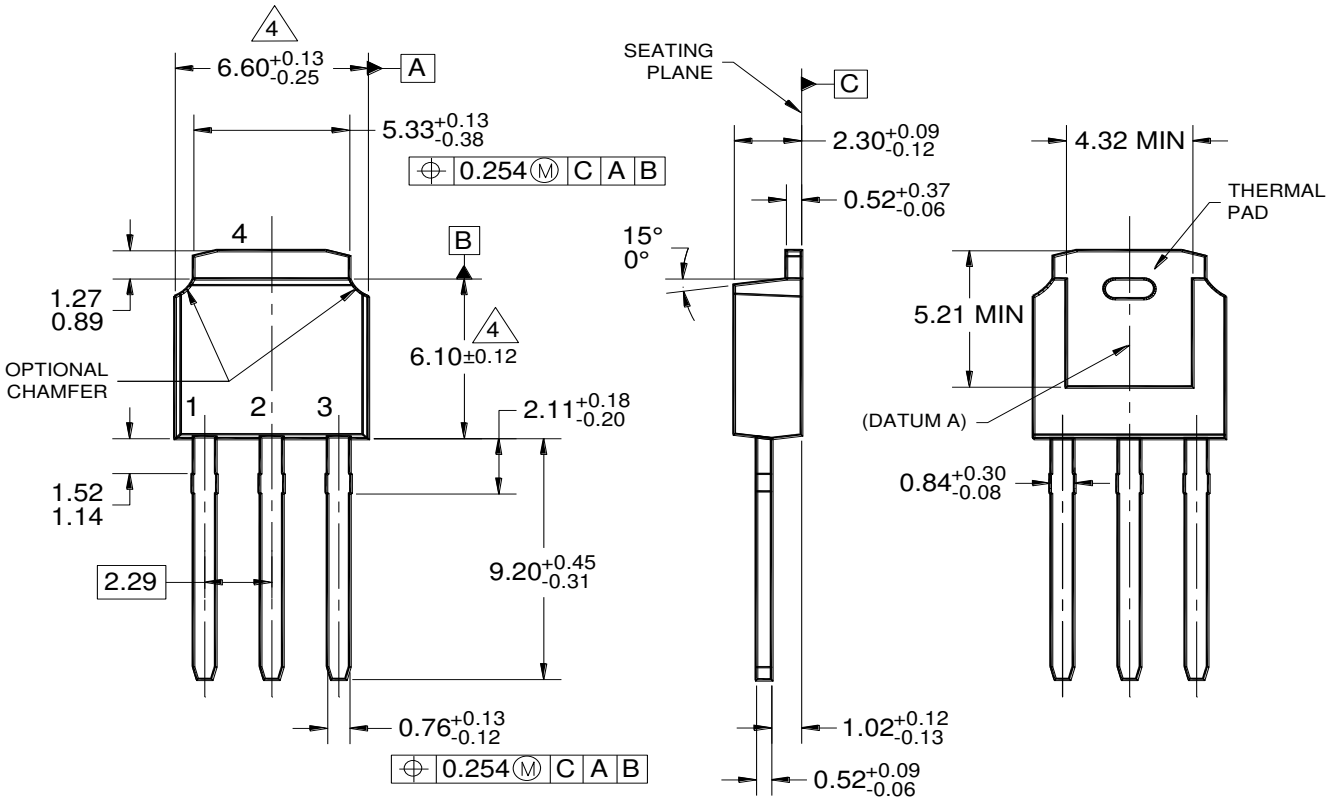
L = LOT CODE

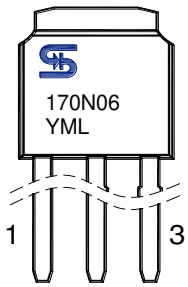
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. EXCEPT LEAD LENGTH, THE JEDEC REFERENCE IS TO-251, VARIATION AA.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO REF: HQ2SD07-IPAKSL-006 REV A.

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251 (IPAK)





MARKING DIAGRAM

Y = YEAR CODE

M = MONTH CODE FOR HALOGEN FREE PRODUCT

O =JAN	P =FEB	Q=MAR	R = APR
S =MAY	T =JUN	U=JUL	V = AUG
W =SEP	X =OCT	Y=NOV	Z = DEC

L = LOT CODE

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. THIS CONFORM TO JEDEC PACKAGE REGISTRATION TO-251, VARIATION AA.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO REF: HQ2SD07-IPAK-005 REV A.

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Purchasers are solely responsible for the choice, selection, and use of TSC products and TSC assumes no liability for application assistance or the design of Purchasers' products.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.