

N-Channel Power MOSFET

700V, 3.5A, 3.3Ω

FEATURES

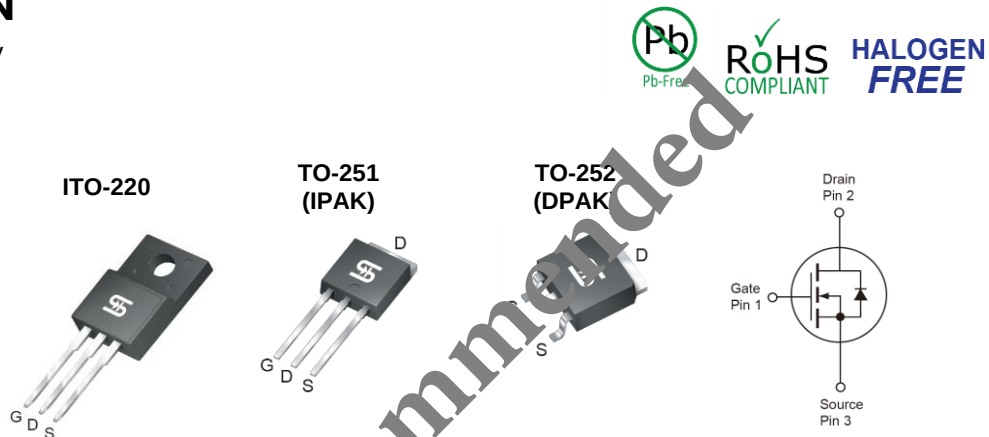
- High power and current handling capability
- Pb-free plating
- RoHS compliant
- Halogen-free mold compound

APPLICATION

- Power Supply
- Lighting

KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
V_{DS}	700	V
$R_{DS(on)}$ (max)	3.3	Ω
Q_g	14	nC



Notes: MSL 3 (Moisture Sensitivity Level) for TO-252 (DPAK) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT		UNIT
		ITO-220	IPAK/DPAK	
Drain-Source Voltage	V_{DS}	700		V
Gate-Source Voltage	V_{GS}	±30		V
Continuous Drain Current (Note 1)	I_D	2	3.5	A
		1.3	1.6	
Pulsed Drain Current (Note 2)	I_{DM}	8	14	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_{DTOT}	38	56	W
Single Pulsed Avalanche Energy (Note 3)	E_{AS}	43		mJ
Single Pulsed Avalanche Current (Note 3)	I_{AS}	3.5		A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150		°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT		UNIT
		ITO-220	IPAK/DPAK	
Junction to Case Thermal Resistance	$R_{\theta JC}$	3.6	2.2	°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	50	°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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	700	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2	--	4	V
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Zero Gate Voltage Drain Current	$V_{DS} = 700V, V_{GS} = 0V$	I_{DSS}	--	--	25	μA
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 2A$	$R_{DS(on)}$	--	2.5	3.3	Ω
Dynamic (Note 5)						
Total Gate Charge	$V_{DS} = 480V, I_D = 4A,$ $V_{GS} = 10V$	Q_g	--	14	--	nC
Gate-Source Charge		Q_{gs}	--	3	--	
Gate-Drain Charge		Q_{gd}	--	6	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	C_{iss}	--	595	--	pF
Output Capacitance		C_{oss}	--	80	--	
Reverse Transfer Capacitance		C_{rss}	--	20	--	
Switching (Note 6)						
Turn-On Delay Time	$V_{DD} = 300V,$ $R_{GEN} = 25\Omega,$ $I_D = 4A, V_{GS} = 10V,$	$t_{d(on)}$	--	18	--	ns
Turn-On Rise Time		t_r	--	17	--	
Turn-Off Delay Time		$t_{d(off)}$	--	40.5	--	
Turn-Off Fall Time		t_f	--	19	--	
Source-Drain Diode (Note 4)						
Forward On Voltage	$I_S = 2.5A, V_{GS} = 0V$	V_{SD}	--	--	1.5	V

Notes:

- Current limited by package
- Pulse width limited by the maximum junction temperature
- $L = 7mH, I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$, 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
TSM4N70CI C0G	ITO-220	50pcs / Tube
TSM4N70CH C5G	TO-251 (IPAK)	75pcs / Tube
TSM4N70CP ROG	TO-252 (DPAK)	2,500pcs / 13" Reel

Note:

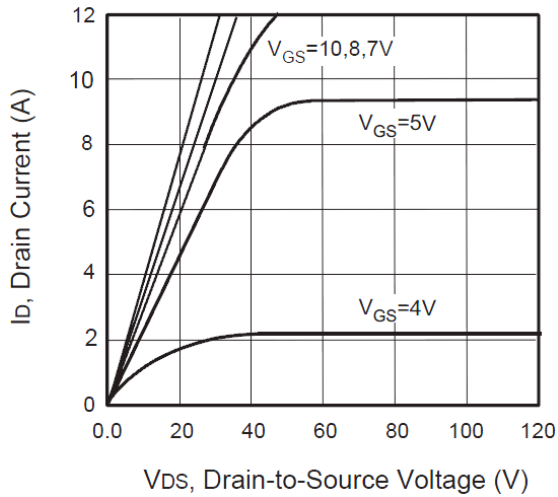
1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

Not Recommended

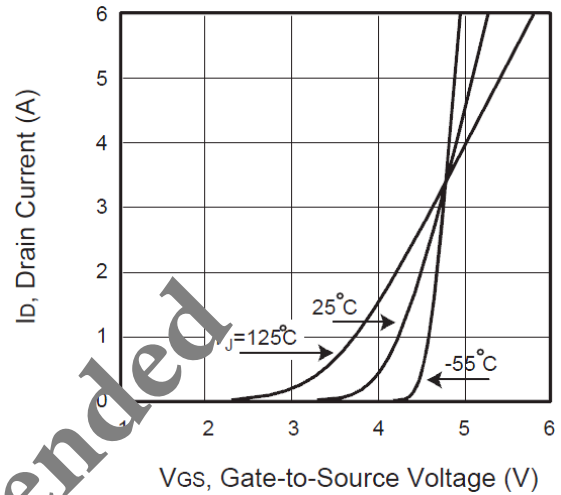
CHARACTERISTICS CURVES

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

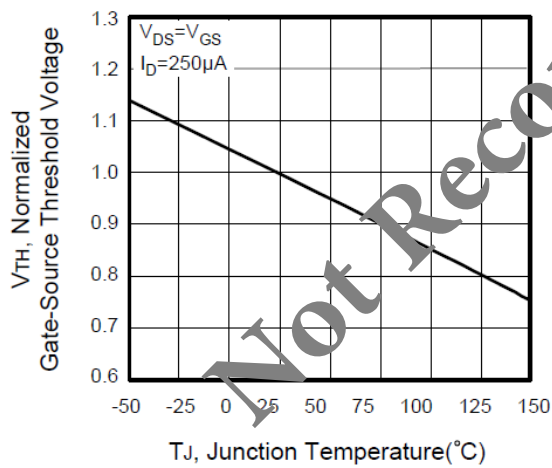
Output Characteristics



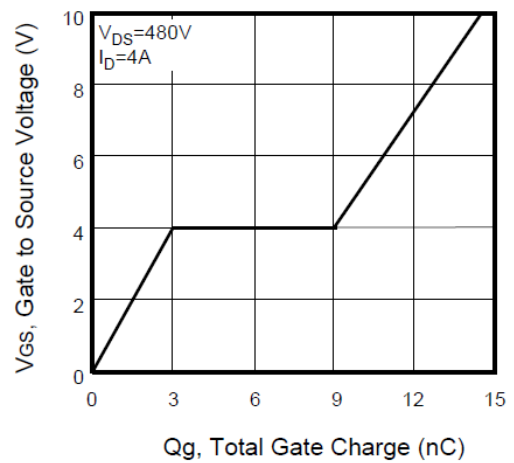
Transfer Characteristics



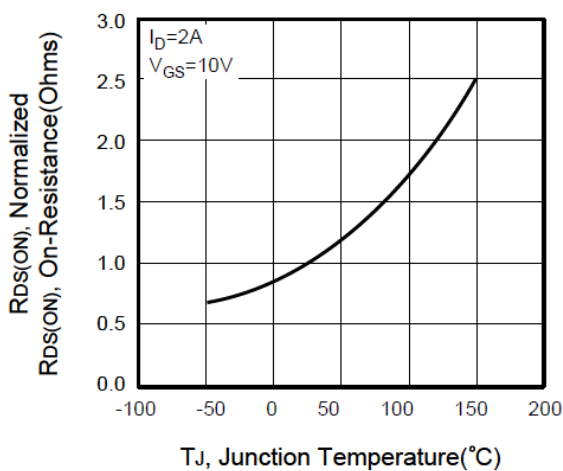
Normalized V_{th} vs. Junction Temperature



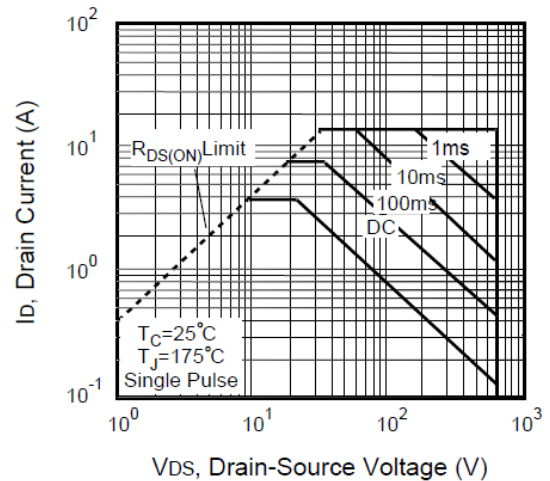
Gate Charge



On-Resistance Variation vs. Temperature



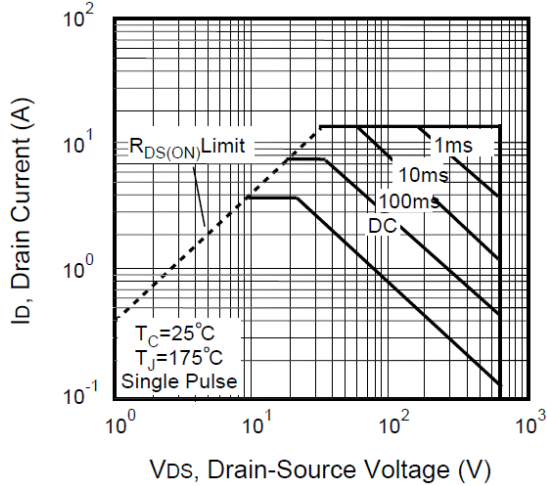
Maximum Safe Operating Area (ITO-220)



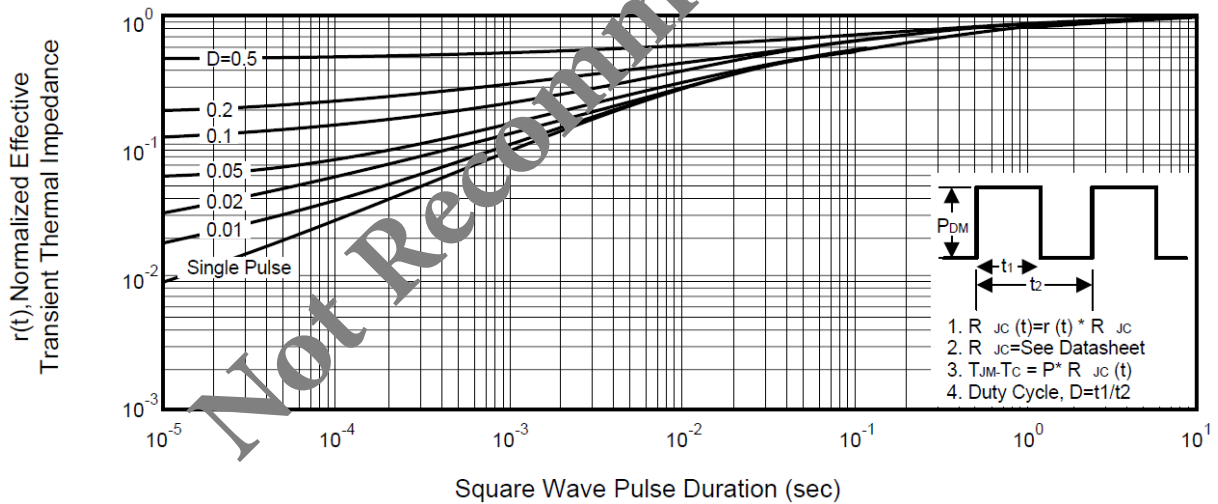
CHARACTERISTICS CURVES

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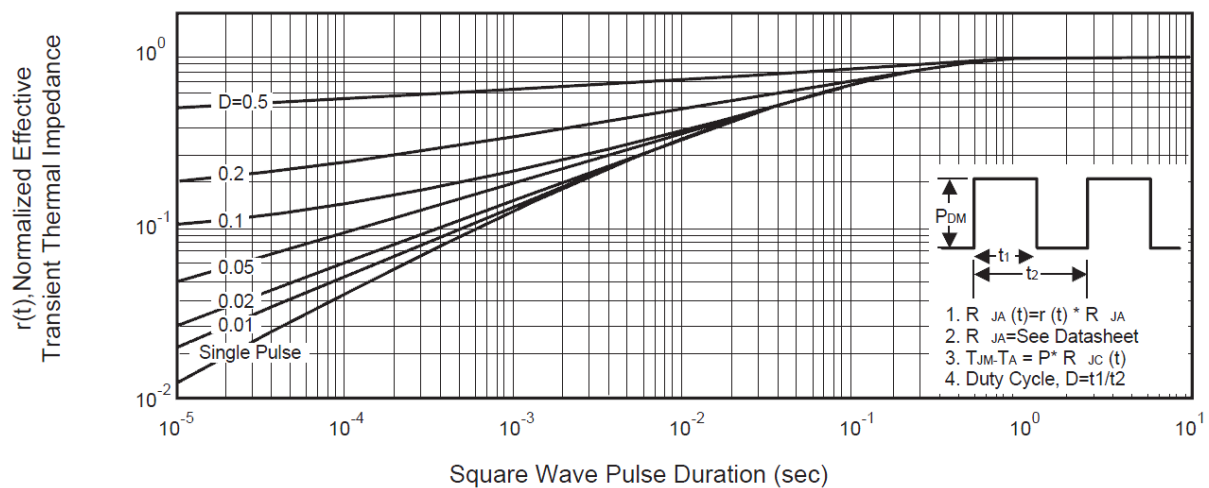
Maximum Safe Operating Area (DPAK,IPAK)



Normalized Thermal Transient Impedance Curve (ITO-220)

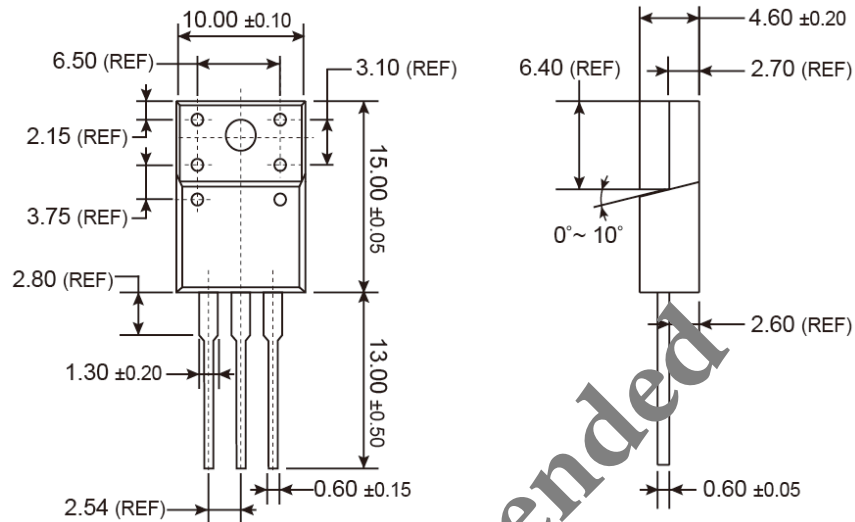


Normalized Thermal Transient Impedance Curve (DPAK,IPAK)

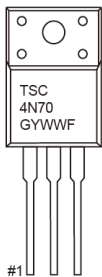


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

ITO-220



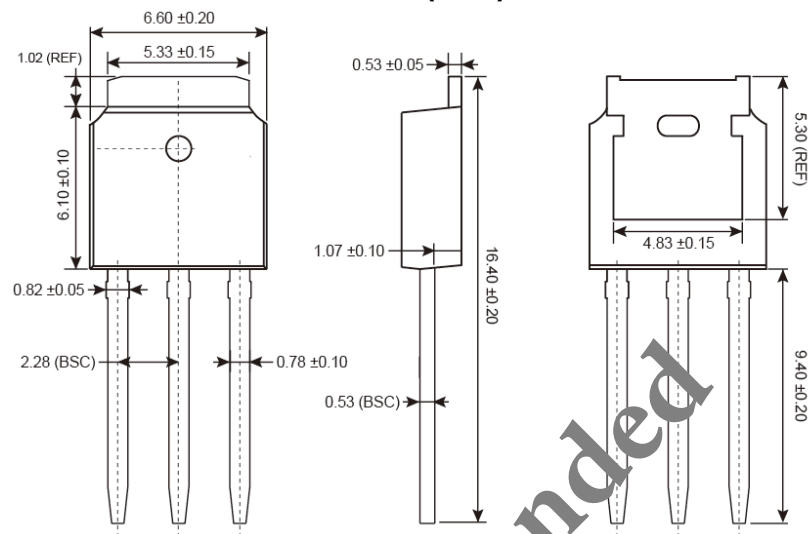
MARKING DIAGRAM



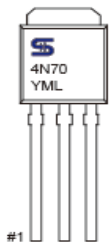
- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251 (IPAK)



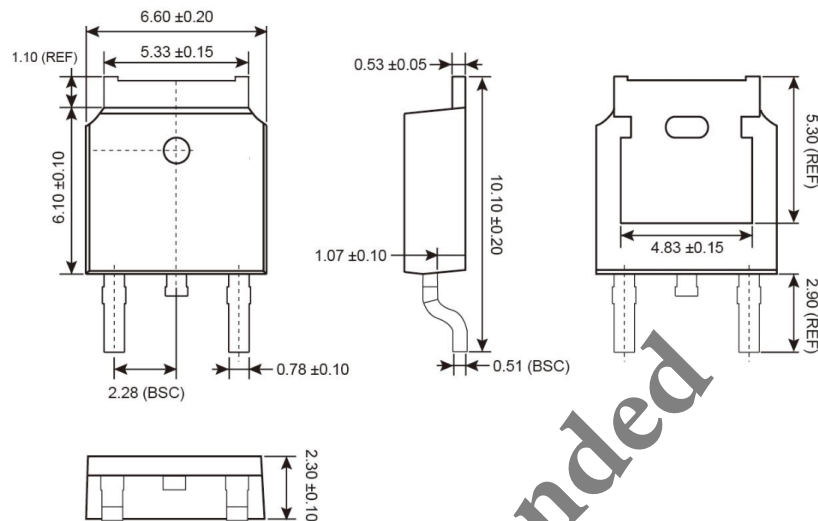
MARKING DIAGRAM



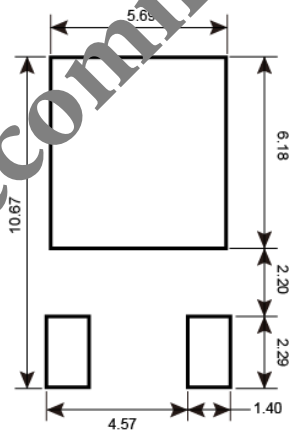
Y = Year Code
M = Month Code for Halogen Free Product
O = Jan P = Feb Q = Mar R = Apr
S = May T = Jun U = Jul V = Aug
W = Sep X = Oct Y = Nov Z = Dec
L = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

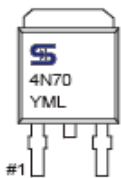
TO-252 (DPAK)



SUGGESTED PAD LAYOUT (Unit: Millimeters)



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 (1~9, A~Z)

Not Recommended

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