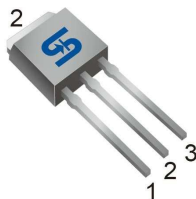




TO-252
(DPAK)



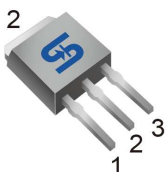
TO-251
(IPAK)



Pin Definition:

1. Gate
2. Drain
3. Source

TO-251S
(IPAK SL)



Key Parameter Performance

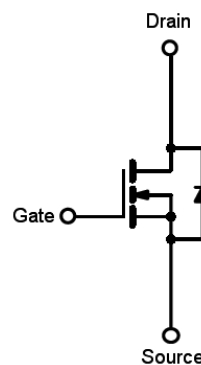
Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on)}(max)$	13	mΩ
Q_g	145	nC

Ordering Information

Part No.	Package	Packing
TSM70N10CP ROG	TO-252	2.5kpcs / 13" Reel
TSM70N10CH C5G	TO-251	75pcs / Tube
TSM70N10CH X0G	TO-251S	75pcs / Tube

Note: "G" denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Block Diagram



N-Channel MOSFET

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^(Note 3)	I_D	$T_C=25^{\circ}C$	70
		$T_C=70^{\circ}C$	61
		$T_A=25^{\circ}C$	12
		$T_A=70^{\circ}C$	9
Drain Current-Pulsed ^(Note 1)	I_{DM}	150	A
Avalanche Current, L=0.5mH	I_{AS}, I_{AR}	25	A
Avalanche Energy, L=0.5mH	E_{AS}, E_{AR}	156	mJ
Maximum Power Dissipation ^(Note 2)	P_D	$T_C=25^{\circ}C$	120
		$T_C=70^{\circ}C$	80
		$T_A=25^{\circ}C$	8.3
		$T_A=70^{\circ}C$	5.3
Storage Temperature Range	T_{STG}	-55 to +150	$^{\circ}C$
Operating Junction Temperature Range	T_J	-55 to +150	$^{\circ}C$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1	$^{\circ}\text{C/W}$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	40	$^{\circ}\text{C/W}$

Electrical Specifications ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

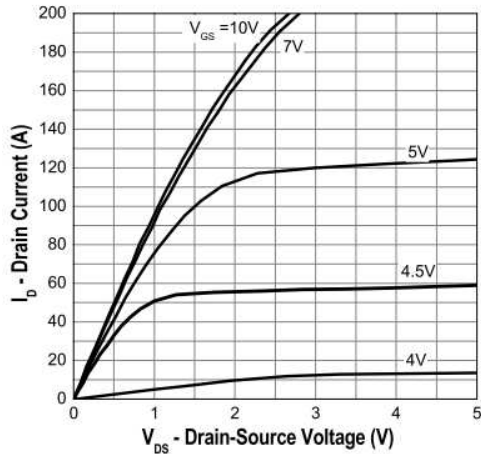
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	100	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{V}, I_D = 30\text{A}$	$R_{DS(ON)}$	--	10	13	m Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$	I_{DSS}	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	nA
Dynamic						
Total Gate Charge	$V_{DS} = 50\text{V}, I_D = 30\text{A},$ $V_{GS} = 10\text{V}$	Q_g	--	145	--	nC
Gate-Source Charge		Q_{gs}	--	25	--	
Gate-Drain Charge		Q_{gd}	--	43	--	
Input Capacitance	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	C_{iss}	--	4300	--	pF
Output Capacitance		C_{oss}	--	300	--	
Reverse Transfer Capacitance		C_{rss}	--	120	--	
Switching						
Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 50\text{V},$ $R_G = 3\Omega$	$t_{d(on)}$	--	27	--	ns
Turn-On Rise Time		t_r	--	13	--	
Turn-Off Delay Time		$t_{d(off)}$	--	15	--	
Turn-Off Fall Time		t_f	--	42	--	
Drain-Source Diode Characteristics and Maximum Rating						
Drain-Source Diode Forward Voltage	$V_{GS}=0\text{V}, I_S=30\text{A}$	V_{SD}	--	0.8	1.3	V
Reverse Recovery Time	$I_S = 30\text{A}, T_J=25^{\circ}\text{C}$ $di/dt = 100\text{A}/\mu\text{s}$	t_{rr}	--	165	--	ns
Reverse Recovery Charge		Q_{rr}	--	175	--	nC

Notes:

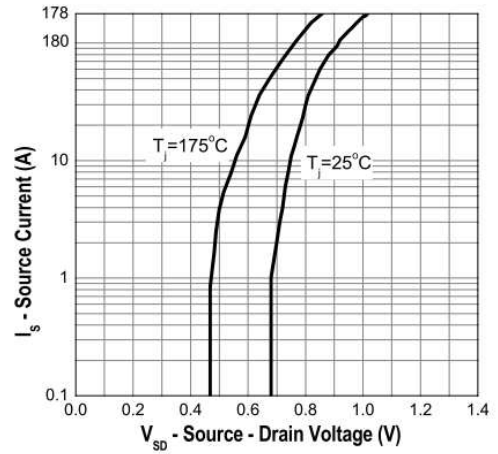
- Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 PCB in still air
- The maximum current is limited by package.

Electrical Characteristics Curves

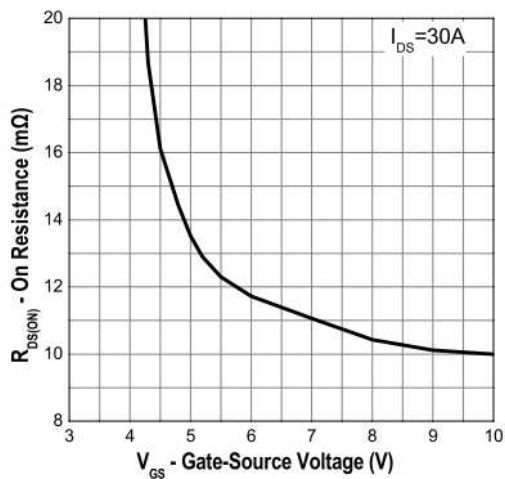
Output Characteristics



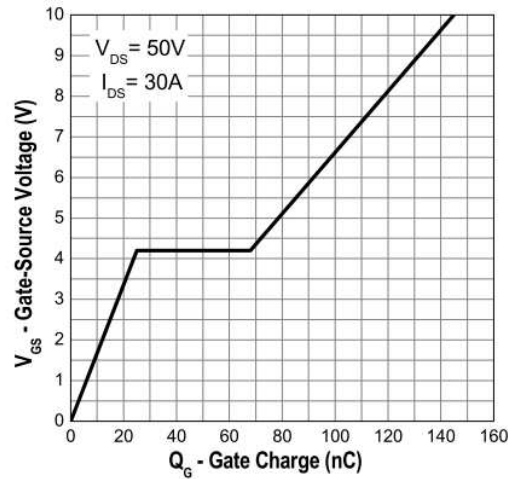
Transfer Characteristics



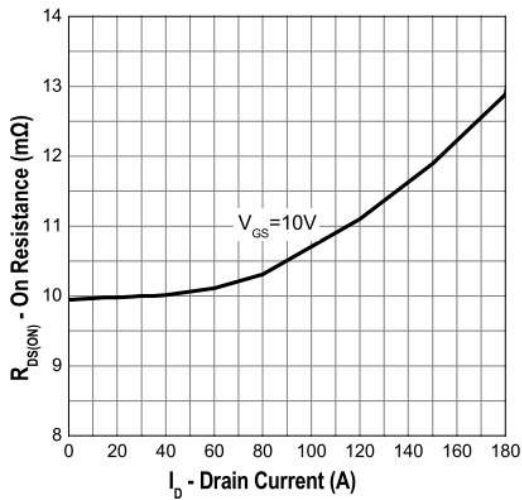
On-Resistance vs. Gate-Source Voltage



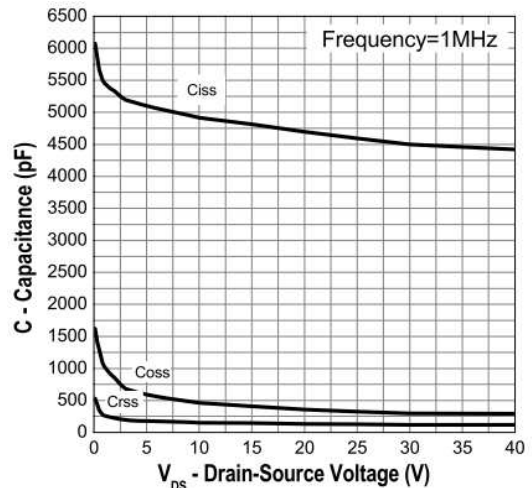
Gate Charge



On-Resistance vs. Junction Temperature



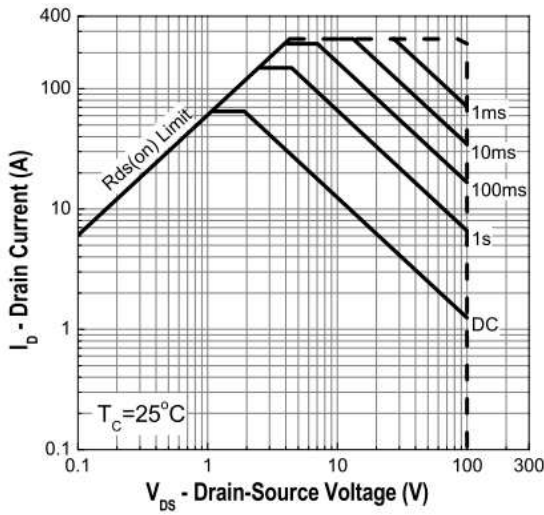
Capacitance



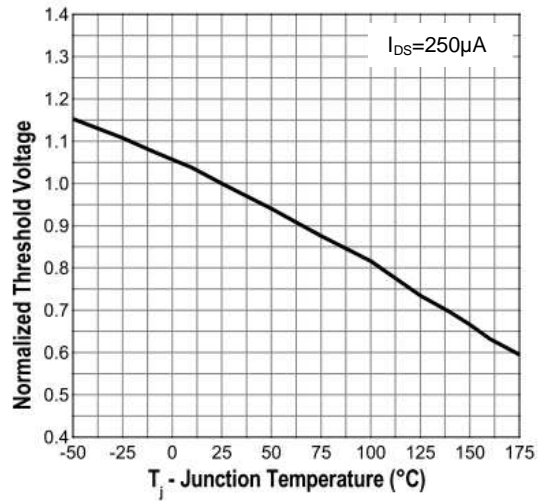


Electrical Characteristics Curves

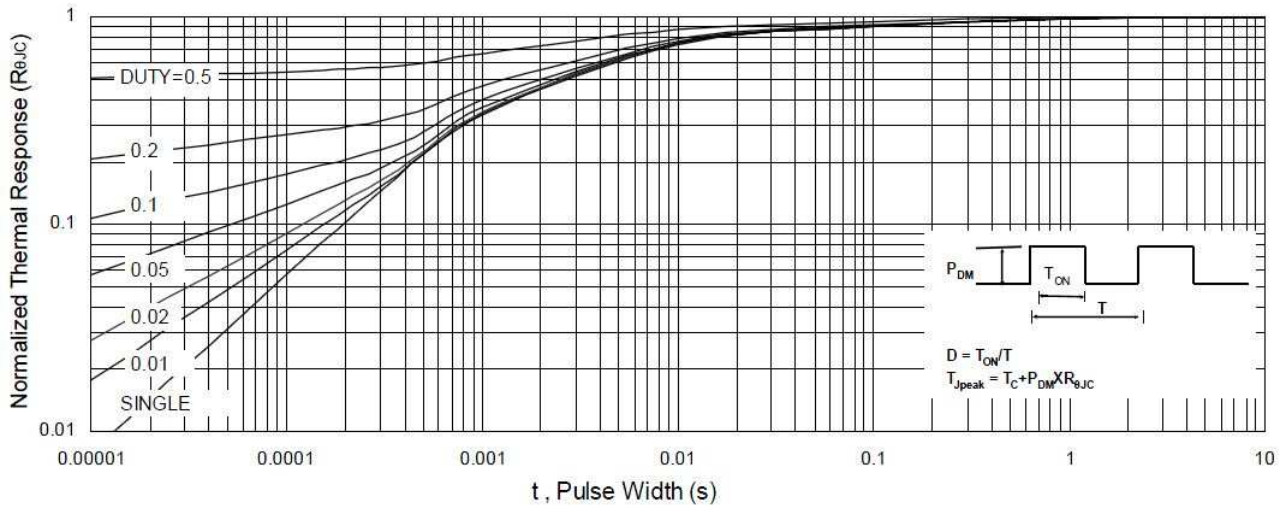
Maximum Safe Operating Area



Threshold Voltage vs. Temperature

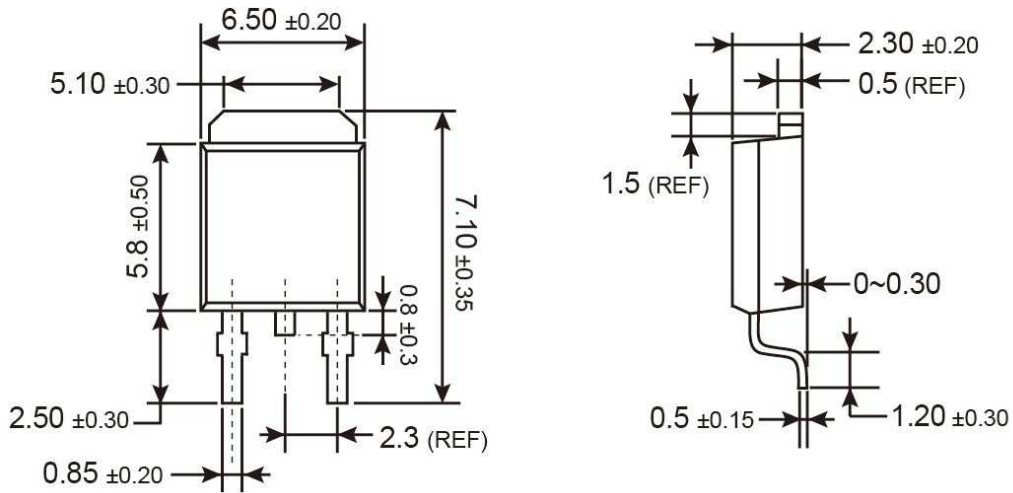


Normalized Thermal Transient Impedance, Junction-to-Ambient



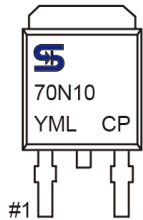


TO-252 Mechanical Drawing



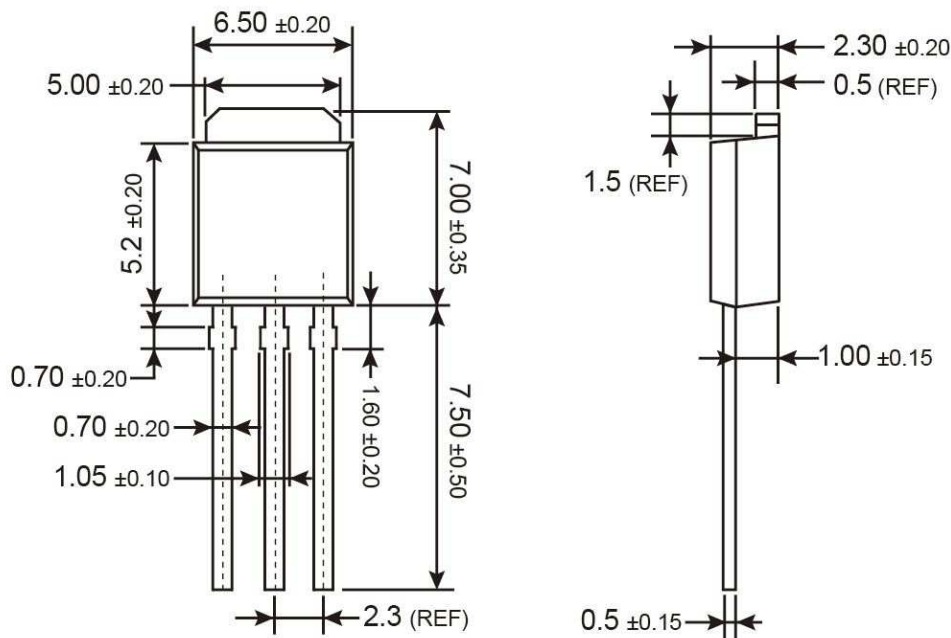
Unit: Millimeters

Marking Diagram



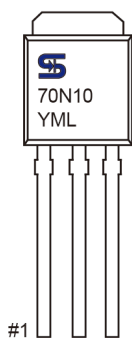
- Y** = Year Code
- M** = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

TO-251 (IPAK) Mechanical Drawing



Unit: Millimeters

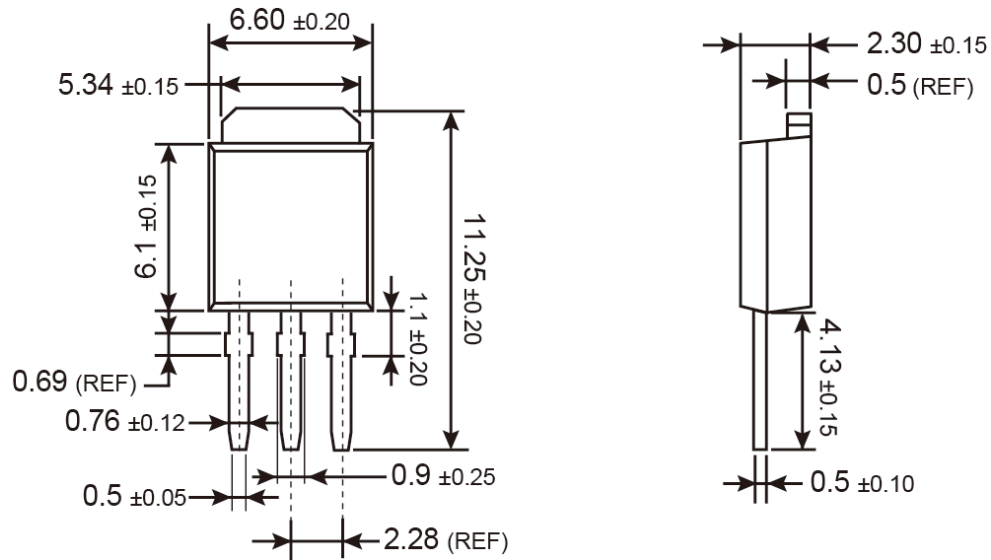
Marking Diagram



- Y** = Year Code
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- L** = Lot Code

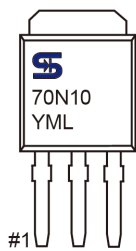


TO-251S (IPAK SL) Mechanical Drawing



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

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