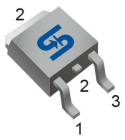
TAIWAN SEMICONDUCTOR

TSM60N1R4

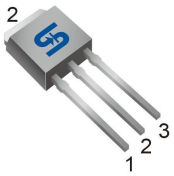
600V, 3.3A, 1.4q
N-Channel Power MOSFET

Pb-Free RoHS COMPLIANT

TO-252 (DPAK)



TO-251 (IPAK)



Pin Definition:
1. Gate
2. Drain
3. Source

Key Parameter Performance

Parameter	Value	Unit
V_{DS}	600	V
$R_{DS(on)}$ (max)	1.4	q
Q_g	7.7	nC

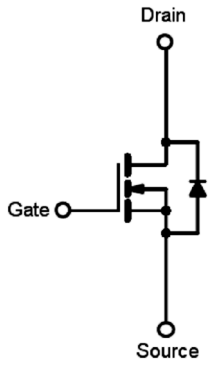
Features

- ð Super-Junction technology
- ð High performance due to small figure-of-merit
- ð High ruggedness performance
- ð High commutation performance

Application

- ð Power Supply
- ð Lighting

Block Diagram



N-Channel MOSFET

Ordering Information

Part No.	Package	Packing
TSM60N1R4CH C5G	TO-251	75pcs / Tube
TSM60N1R4CP ROG	TO-252	2.5kpcs / 13òReel

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

Absolute Maximum Ratings (T_C = 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 (Note 1)	T_C = 25°C	I_D	3.3	A
Pulsed Drain Current (Note 2)		I_{DM}	9.9	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	38	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	64	mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	1.6	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	$R_{\theta JC}$	3.3	°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	°C/W

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Electrical Specifications (T_C = 25°C unless otherwise noted)

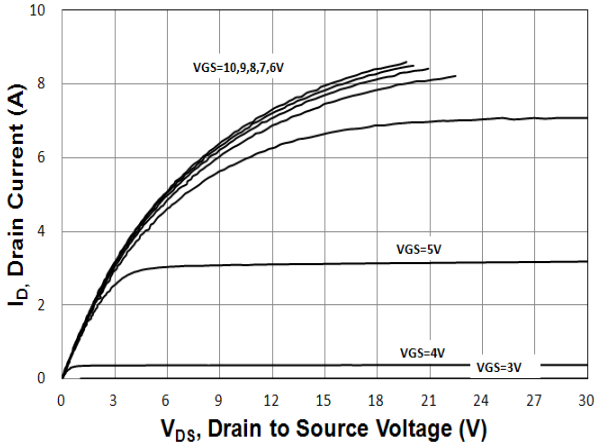
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static (Note 4)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250µA	BV_{DSS}	600	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250µA	$V_{GS(TH)}$	2	3	4	V
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	I_{DSS}	--	--	1	µA
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 2A	$R_{DS(ON)}$	--	0.88	1.4	q
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 380V, I_D = 3.3A, V_{GS} = 10V	Q_g	--	7.7	--	nC
Gate-Source Charge		Q_{gs}	--	1.9	--	
Gate-Drain Charge		Q_{gd}	--	2.8	--	
Input Capacitance	V_{DS} = 100V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	370	--	pF
Output Capacitance		C_{oss}	--	34	--	
Gate Resistance	f = 1MHz, open drain	R_g	--	3.4	--	q
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 380V, R_{GEN} = 25q , I_D = 3.3A, V_{GS} = 10V,	$t_{d(on)}$	--	14	--	ns
Turn-On Rise Time		t_r	--	22	--	
Turn-Off Delay Time		$t_{d(off)}$	--	24	--	
Turn-Off Fall Time		t_f	--	20	--	
Source-Drain Diode (Note 4)						
Forward On Voltage	I_S = 3.3A, V_{GS} = 0V	V_{SD}	--	--	1.4	V
Reverse Recovery Time	V_R = 200V, I_S = 2A dI_F/dt = 100A/εs	t_{rr}	--	163	--	ns
Reverse Recovery Charge		Q_{rr}	--	1	--	εC

Notes:

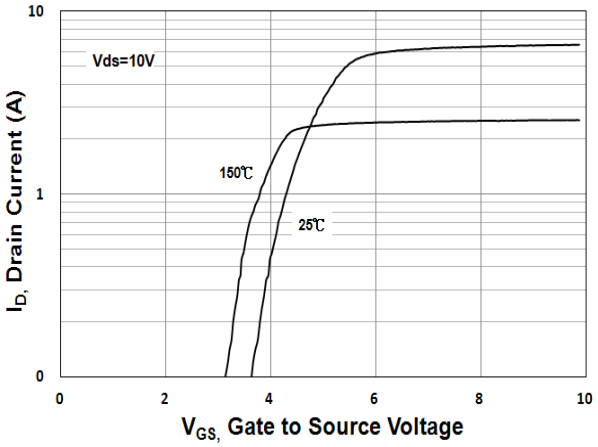
1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 50mH, I_{AS} = 1.6A, V_{DD} = 50V, R_G = 25q , Starting T_J = 25°C
4. Pulse test: PW Ò300µs, duty cycle Ò2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

Electrical Characteristics Curves

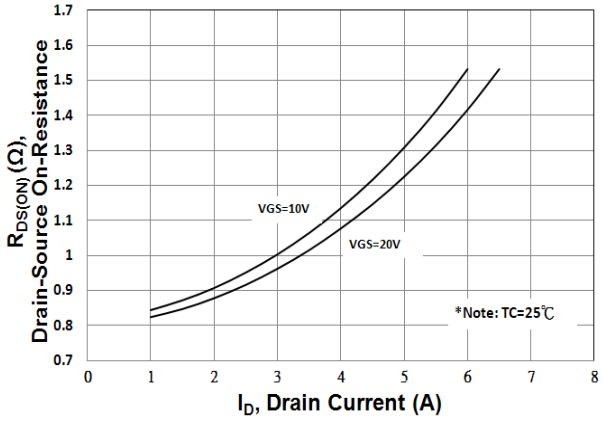
Output Characteristics



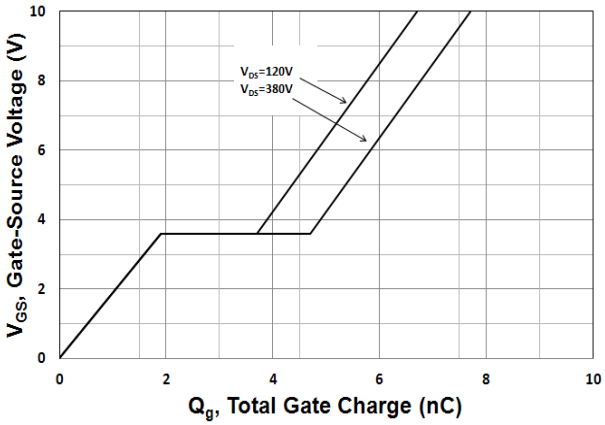
Transfer Characteristics



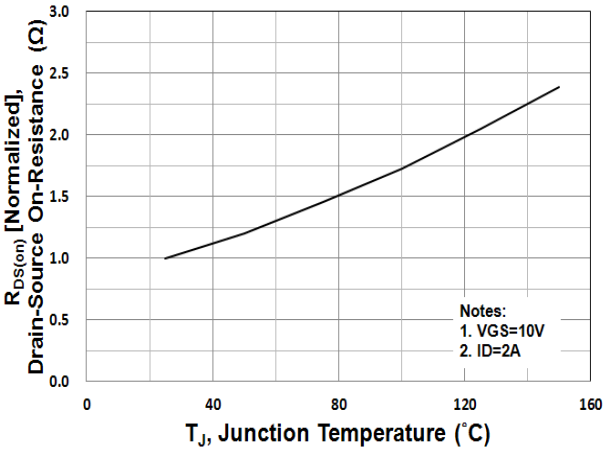
On-Resistance vs. Drain Current



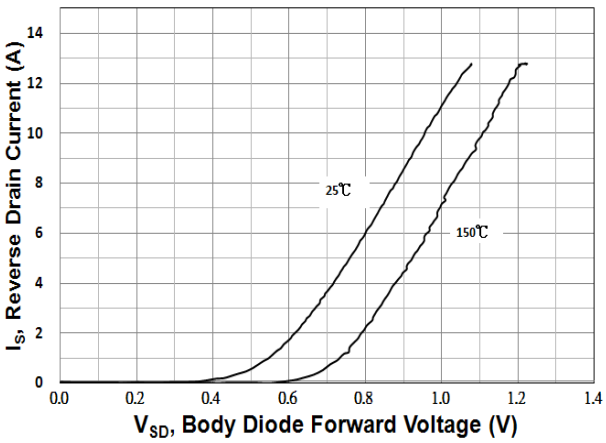
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

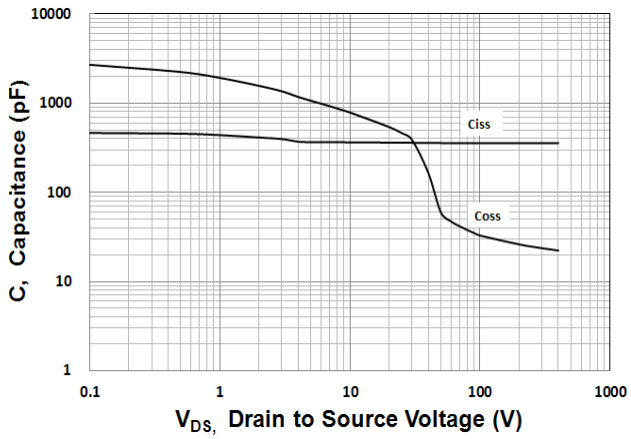


Source-Drain Diode Forward Current vs. Voltage

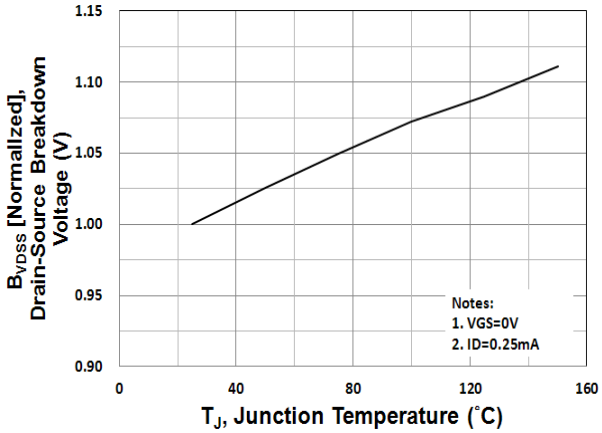


Electrical Characteristics Curves

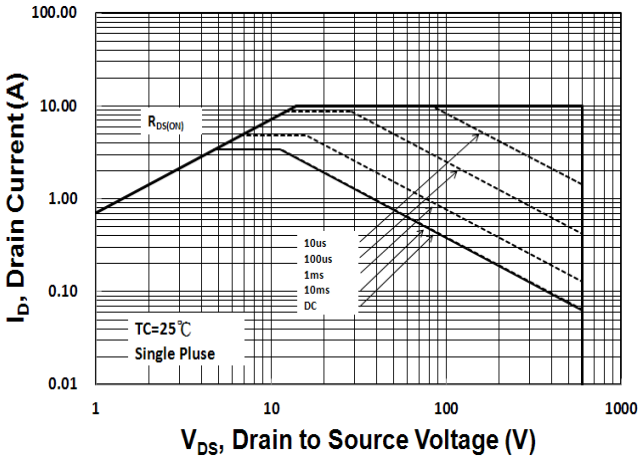
Capacitance vs. Drain-Source Voltage



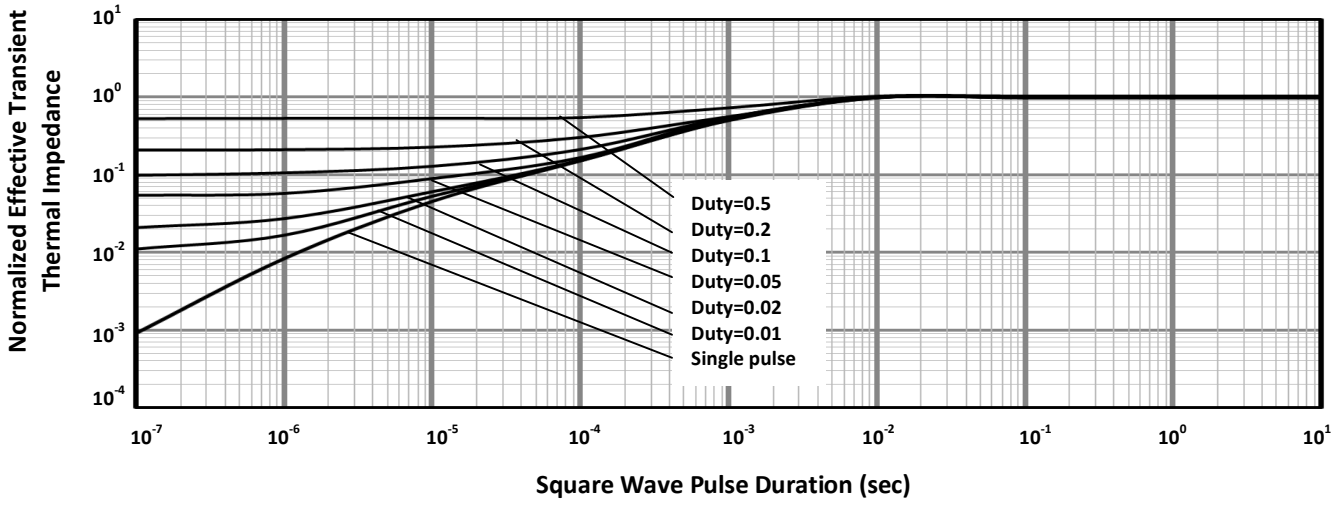
BV_{DSS} vs. Junction Temperature



Maximum Safe Operating Area (DPAK/IPAK)



Normalized Thermal Transient Impedance, Junction-to-Case (DPAK/IPAK)



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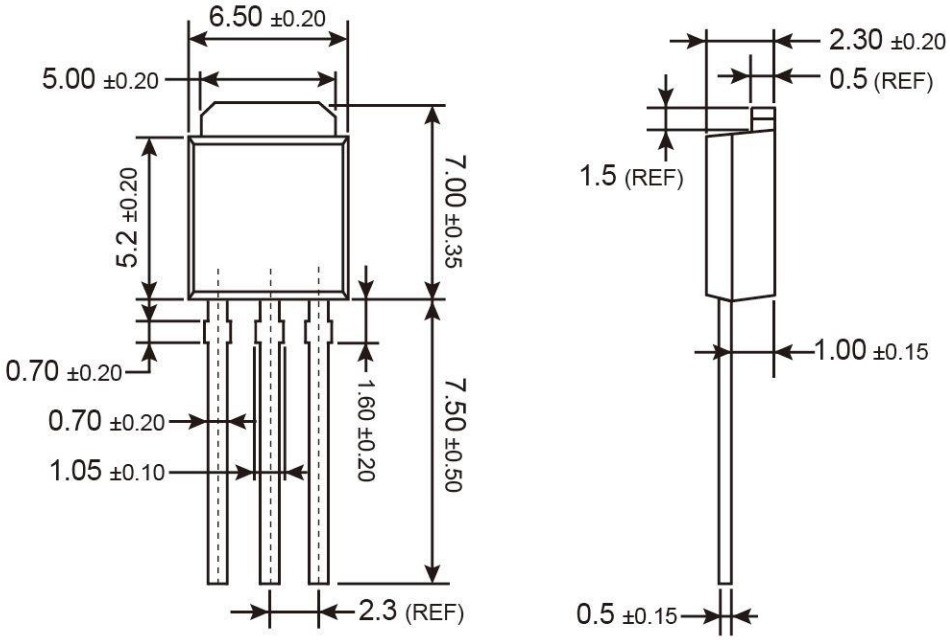
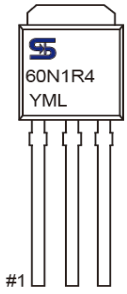
TO-251 (IPAK) Mechanical Drawing



Unit: Millimeter

Marking Diagram



Y = Year Code

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

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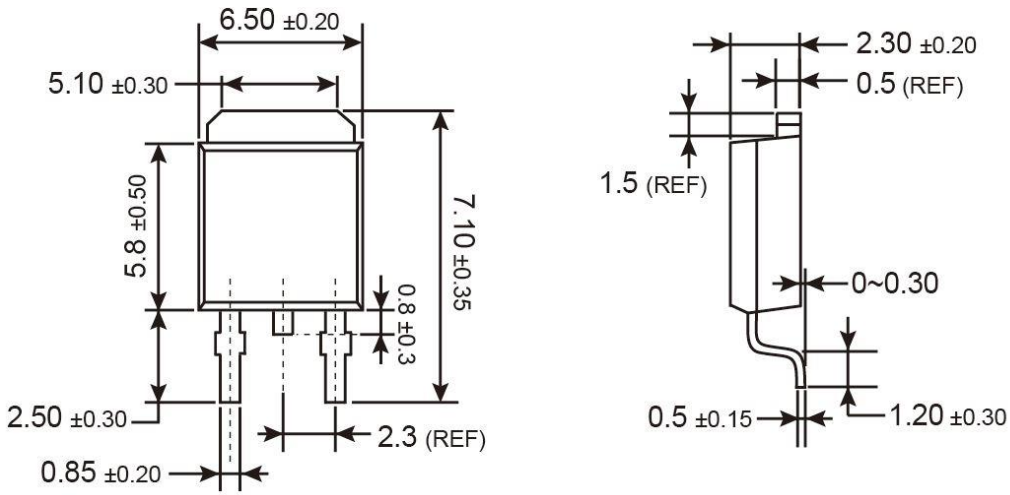

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