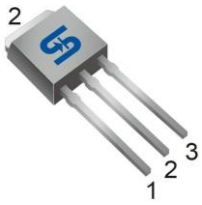
TAIWAN SEMICONDUCTOR

TSM2N60E

600V, 2A, 4Ω
N-Channel Power MOSFET

Pb-Free RoHS COMPLIANT

TO-251 (IPAK)



TO-252 (DPAK)

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

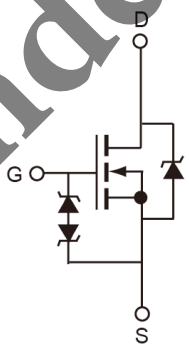
Key Parameter Performance

Parameter	Value	Unit
V_{DS}	600	V
$R_{DS(on)}$(max)	4	Ω
Qg (typ)	9.5	nC

Features

- 100% Avalanche Tested
- G-S ESD Protection Diode Embedded

Block Diagram



N-Channel MOSFET with ESD Protection

Ordering Information

Ordering code	Package	Packing
TSM2N60ECH C5G	TO-251	75pcs / Tube
TSM2N60ECP ROG	TO-252	2.5kpcs / 13” Reel

Note: Halogen-free according to IEC 61249-2-21 definition

Absolute Maximum Ratings (T_C = 25℃ 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)	Tc = 25℃	I_D	2	A
	Tc = 100℃		1.43	A
Pulsed Drain Current (Note 2)		I_{DM}	8	A
Repetitive Avalanche Current (Note 1)		I_{AR}	2	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	5.2	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	66	mJ
Total Power Dissipation	T_C = 25℃	P_D	52.1	W
	Derate above T_C = 25℃		0.416	W/℃
Peak Diode Recovery dV/dt (Note 4)		dV/dt	4.5	V/ns
Operating Junction Temperature		T_J	-55 to +150	℃
Storage Temperature Range		T_{STG}	-55 to +150	℃

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\Theta JC}$	2.4	℃/W
Thermal Resistance - Junction to Ambient	$R_{\Theta JA}$	110	℃/W

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Electrical Specifications (T_C = 25℃ unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static (Note 5)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	600	--	--	V
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 1A	$R_{DS(ON)}$	--	3.2	4	Ω
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	3	--	5	V
Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
	V_{DS} = 480V, T_J = 125℃		--	--	10	
Gate Body Leakage	V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}	--	--	±100	μA
Forward Transconductance	V_{DS} = 30V, I_D = 1A	g_{fs}	--	3	--	S
Dynamic (Note 6)						
Total Gate Charge	V_{DS} = 480V, I_D = 2A, V_{GS} = 10V	Q_g	--	9.5	--	nC
Gate-Source Charge		Q_{gs}	--	2.1	--	
Gate-Drain Charge		Q_{gd}	--	3.9	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	C_{iss}	--	362	--	pF
Output Capacitance		C_{oss}	--	40	--	
Reverse Transfer Capacitance		C_{rss}	--	7.2	--	
Switching (Note 7)						
Turn-On Delay Time	V_{DD} = 300V , V_{GS} = 10V , R_G = 25Ω, I_D = 2A	$t_{d(on)}$	--	21	--	ns
Turn-On Rise Time		t_r	--	22	--	
Turn-Off Delay Time		$t_{d(off)}$	--	41	--	
Turn-Off Fall Time		t_f	--	21	--	
Source-Drain Diode Ratings and Characteristic (Note 5)						
Maximum Continuous Drain-Source Diode Forward Current		I_S	--	--	2	A
Maximum Pulse Drain-Source Diode Forward Current		I_{SM}	--	--	8	A
Diode-Source Forward Voltage	V_{GS} = 0V, I_S = 2A	V_{SD}	--	--	1.5	V
Reverse Recovery Time	V_{GS} = 0V, I_S = 2A, dI_F/dt = 100A/μs	t_{rr}	--	238	--	ns
Reverse Recovery Charge		Q_{rr}	--	0.8	--	nC

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. V_{DD} = 50V, L= 30.5mH, I_{AS} = 2A, R_G = 25Ω, Starting T_J = 25℃
4. I_{SD} ≤ 2A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DS}, Starting T_J = 25℃
5. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%
6. For DESIGN AID ONLY, not subject to production testing.
7. Switching time is essentially independent of operating temperature.

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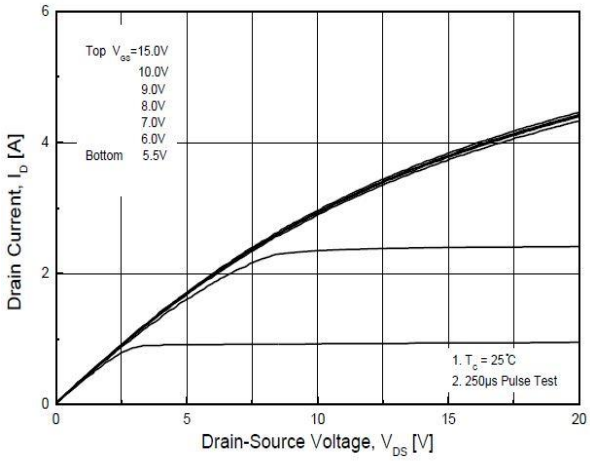
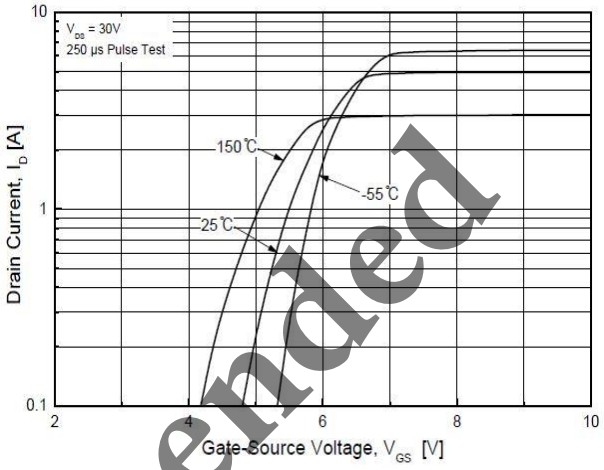
Electrical Characteristics Curves (T_C = 25℃, unless otherwise noted)

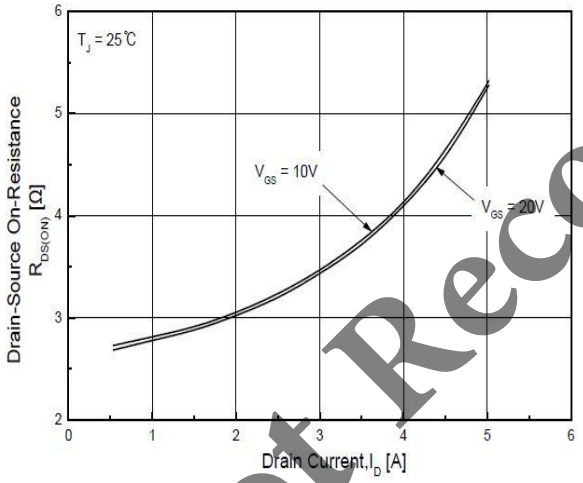
Output Characteristics



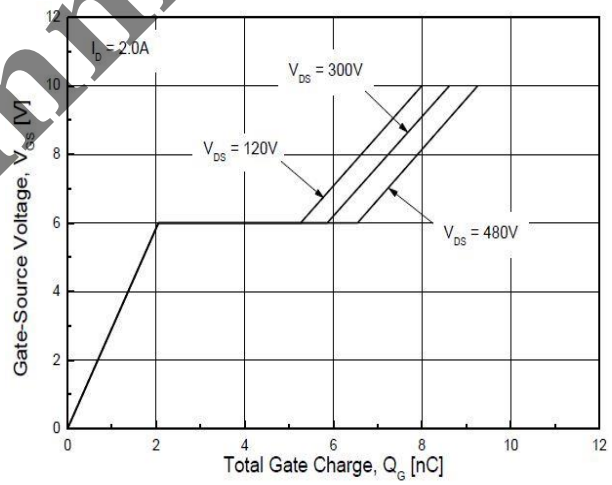
Transfer Characteristics



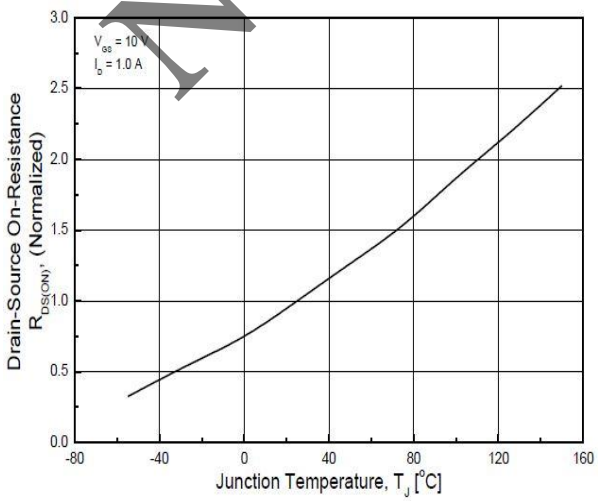
On-Resistance vs. Drain Current



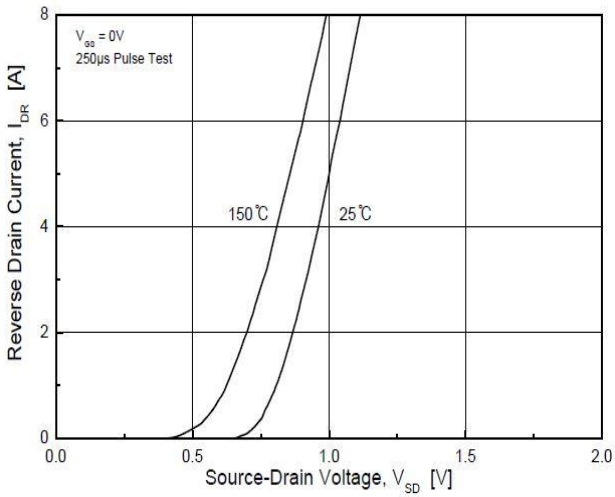
Gate Charge



On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



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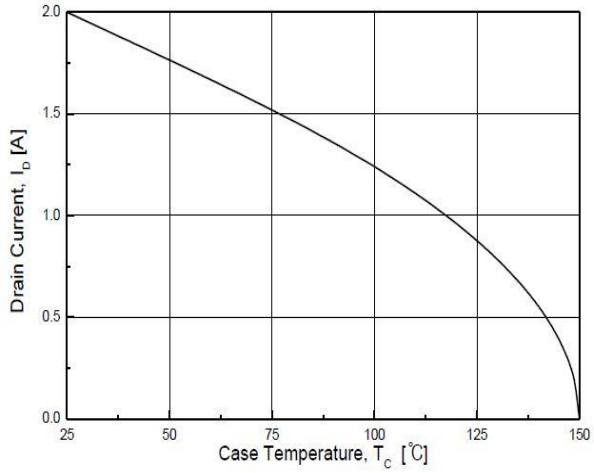
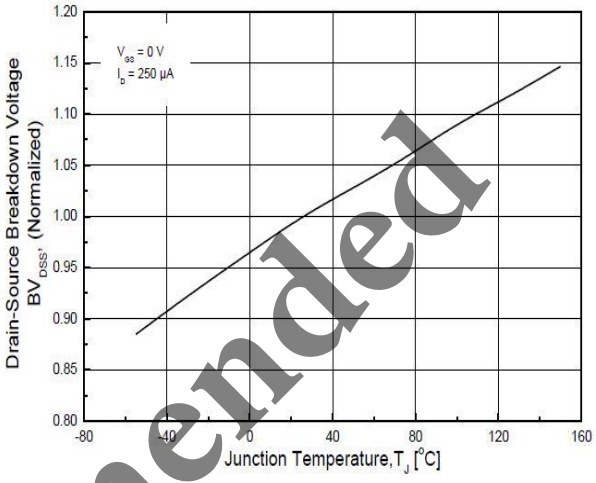
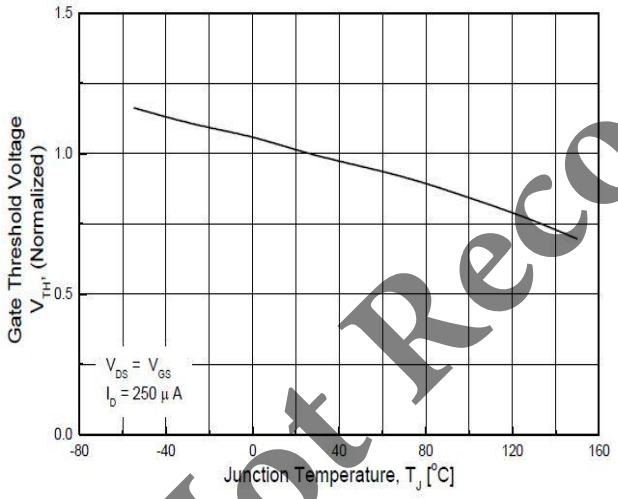
Drain Current vs. Case Temperature



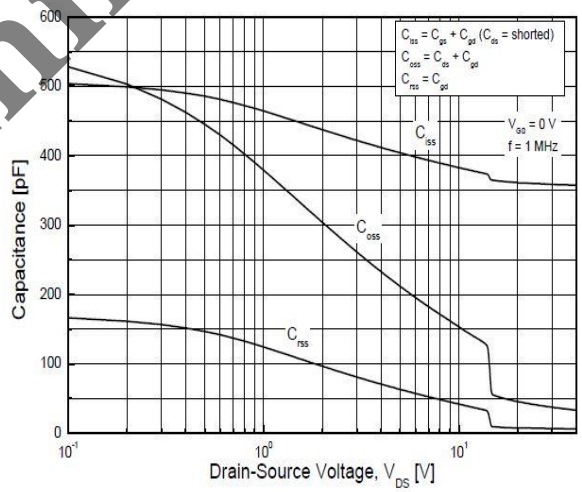
BV_{DSS} vs. Junction Temperature



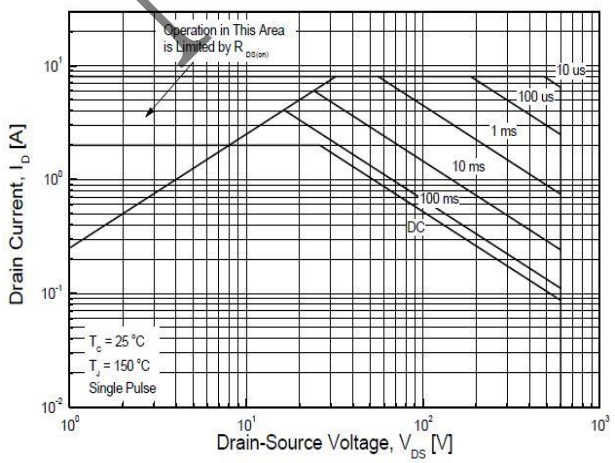
Threshold Voltage vs. Junction Temperature



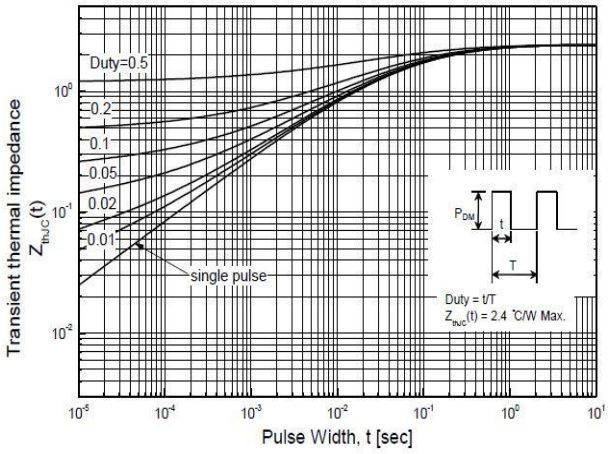
Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area



Normalized Transient Impedance



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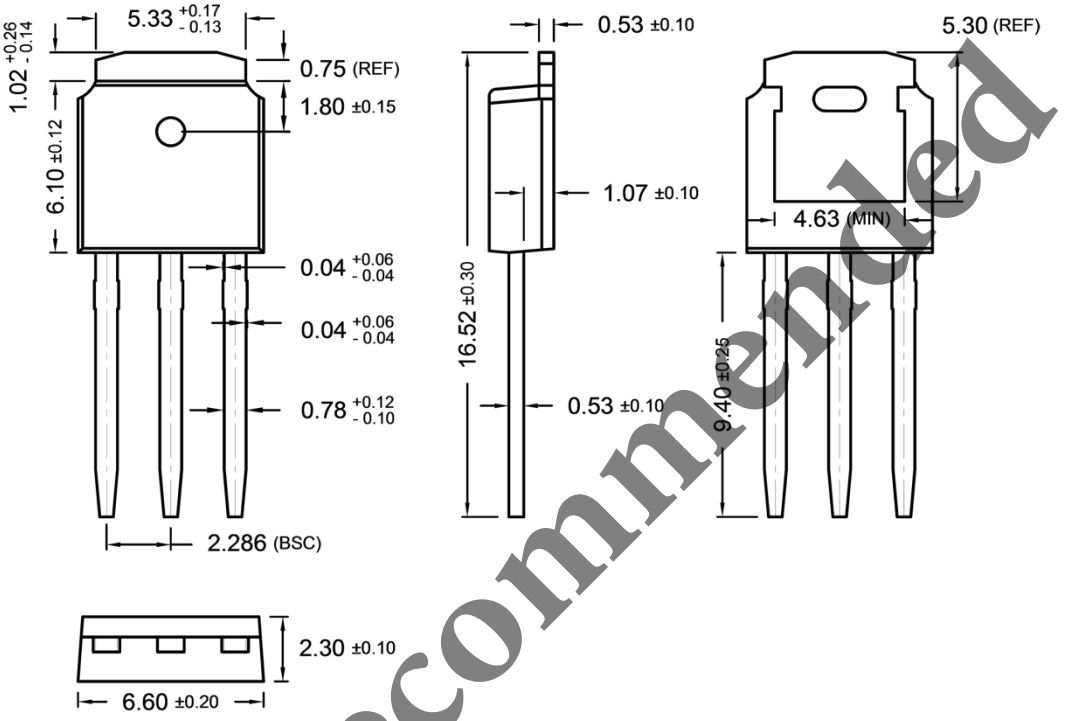
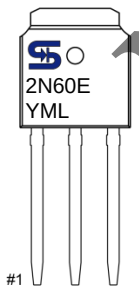
TO-251 Mechanical Drawing



Unit: Millimeters

Marking Diagram



Y = Year Code
M = Month Code

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)

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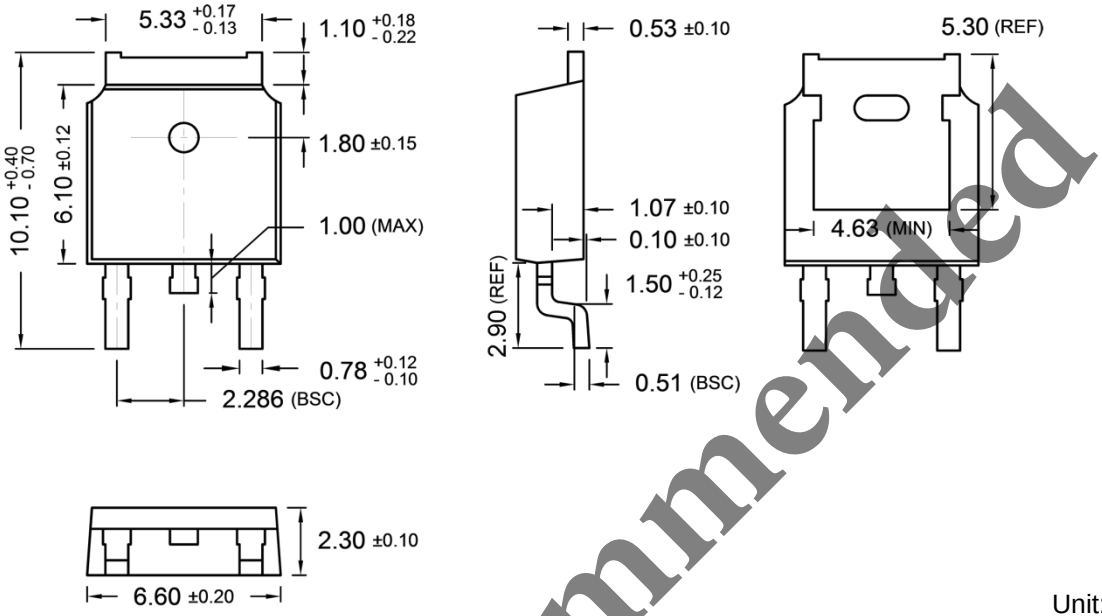
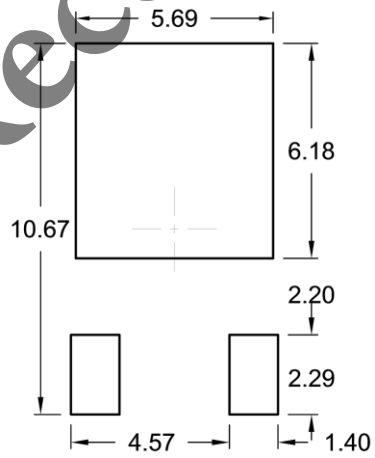
TO-252 Mechanical Drawing

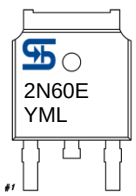


Unit: Millimeters

SUGGESTED PAD LAYOUT (Unit: Millimeters)



Marking Diagram



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