

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

Key Parameter Performance

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

Features

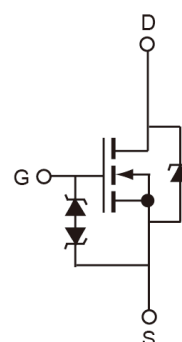
- 100% Avalanche Tested
- G-S ESD Protection Diode Embedded

Ordering Information

Part No.	Package	Packing
TSM2N60ECH C5G	TO-251	75pcs / Tube
TSM2N60ECP ROG	TO-252	2.5kpcs / 13+Reel

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 with ESD Protection

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ 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)	I_D	$T_C = 25^\circ\text{C}$	2
		$T_C = 100^\circ\text{C}$	1.43
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	P_D	$T_C = 25^\circ\text{C}$	52.1
		Derate above $T_C = 25^\circ\text{C}$	0.416
Peak Diode Recovery dV/dt ^(Note 4)	dV/dt	4.5	V/ns
Operating Junction Temperature	T_J	-55 to +150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	R_{JC}	2.4	$^\circ\text{C/W}$
Thermal Resistance - Junction to Ambient	R_{JA}	110	$^\circ\text{C/W}$

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

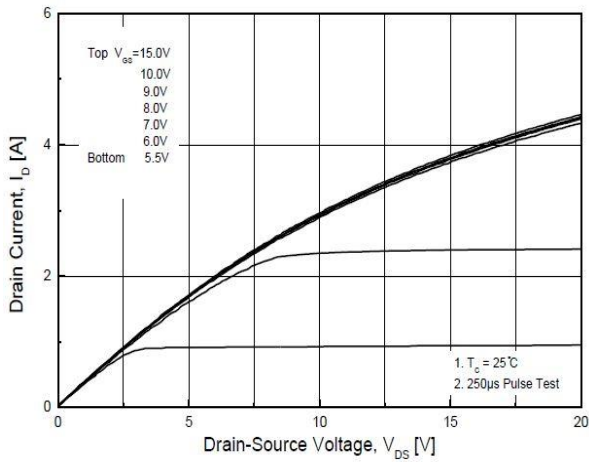
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static (Note 5)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	600	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 1A$	$R_{DS(ON)}$	--	3.2	4	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	3	--	5	V
Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
	$V_{DS} = 480V, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	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	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1\text{MHz}$	C_{iss}	--	362	--	pF
Output Capacitance		C_{oss}	--	40	--	
Reverse Transfer Capacitance		C_{rss}	--	7.2	--	
Switching (Note 7)						
Turn-On Delay Time	$V_{DD} = 300V, V_{GS} = 10V,$ $R_G = 25\Omega, I_D = 2A$	$t_{d(on)}$	--	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	$V_{GS} = 0V, I_S = 2A$	t_{rr}	--	238	--	ns
Reverse Recovery Charge	$di_f/dt = 100A/\mu s$	Q_{rr}	--	0.8	--	nC

Notes:

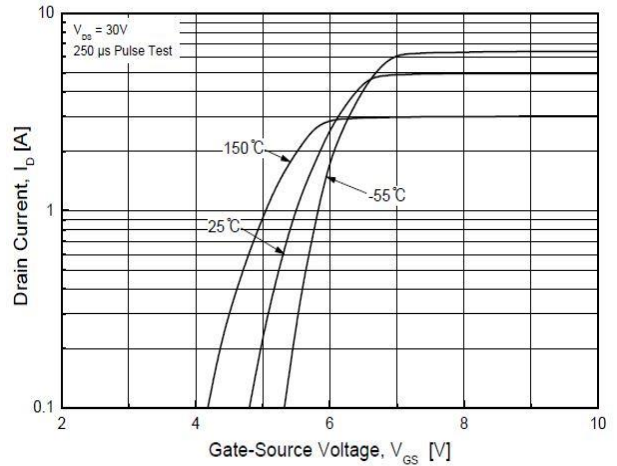
- Current limited by package
- Pulse width limited by the maximum junction temperature
- $V_{DD} = 50V, L = 30.5\text{mH}, I_{AS} = 2A, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
- $I_{SD} \text{ m}2A, di/dt \text{ m}200A/\mu s, V_{DD} \text{ m}BV_{DS}, \text{Starting } T_J = 25^\circ\text{C}$
- Pulse test: PW m300 μs , duty cycle m2%
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

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

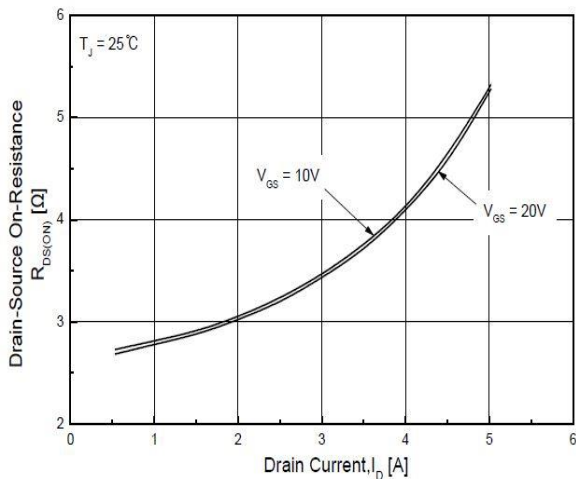
Output Characteristics



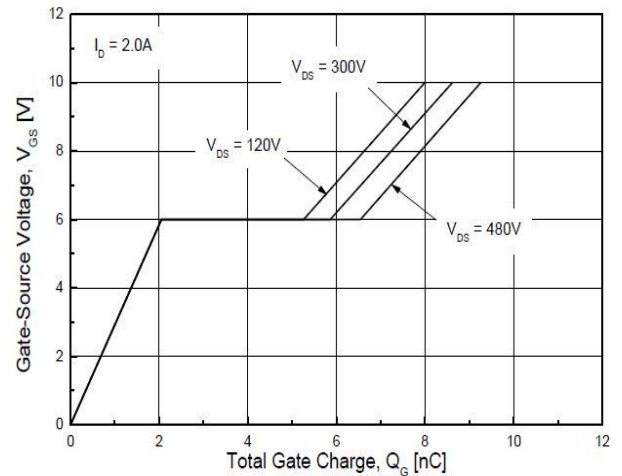
Transfer Characteristics



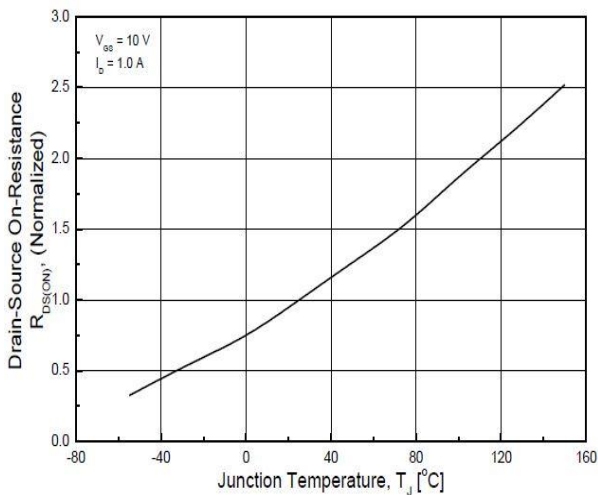
On-Resistance vs. Drain Current



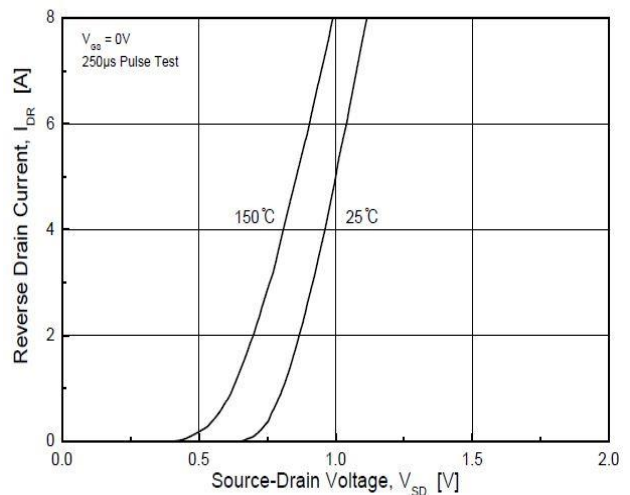
Gate Charge



On-Resistance vs. Junction Temperature

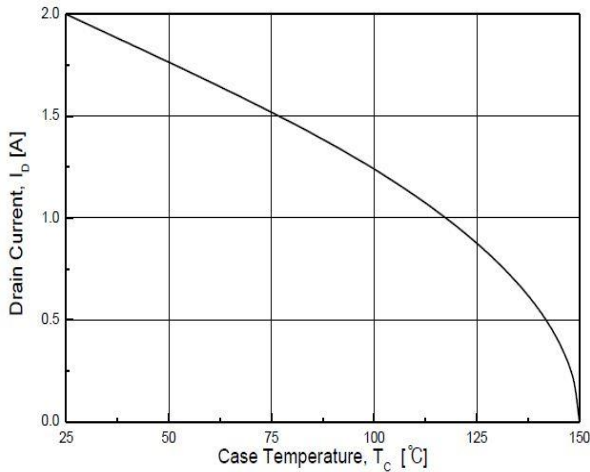


Source-Drain Diode Forward Voltage

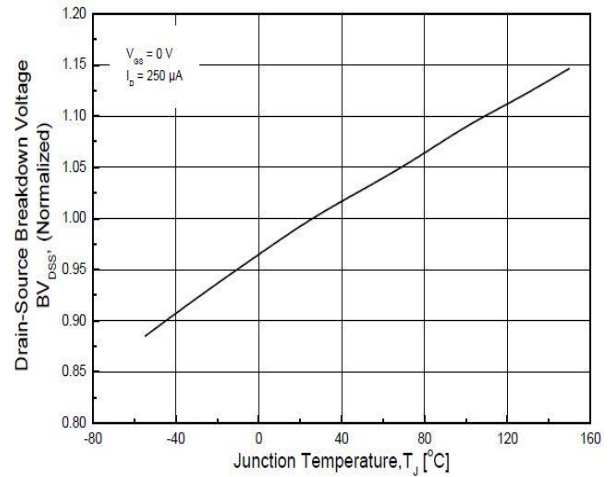


Electrical Characteristics Curve ($T_C = 25^\circ\text{C}$, unless otherwise noted)

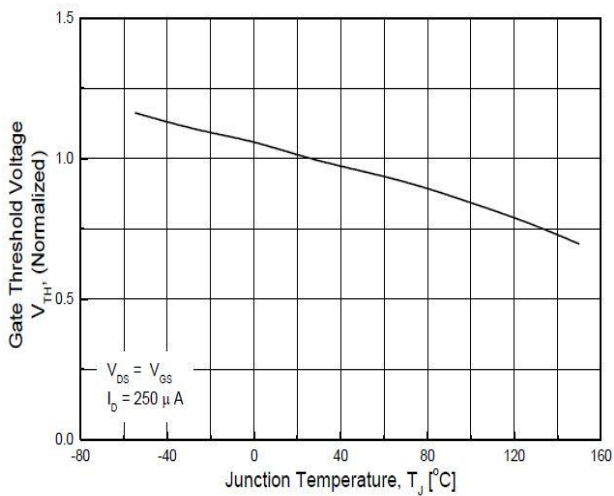
Drain Current vs. Case Temperature



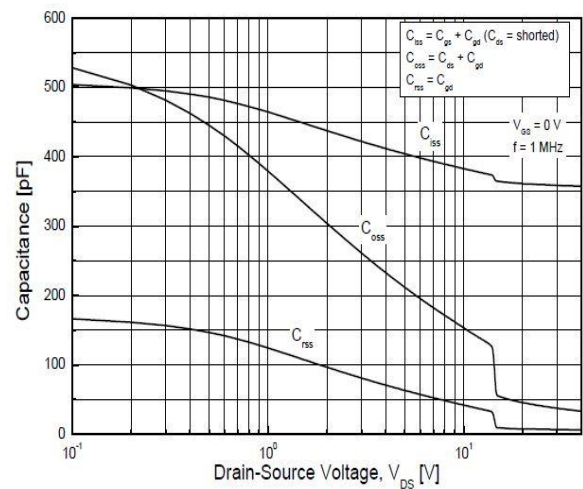
BV_{DSS} vs. Junction Temperature



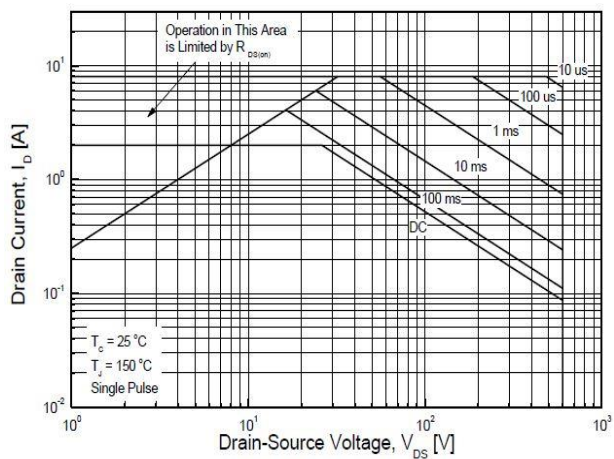
Threshold Voltage vs. Junction Temperature



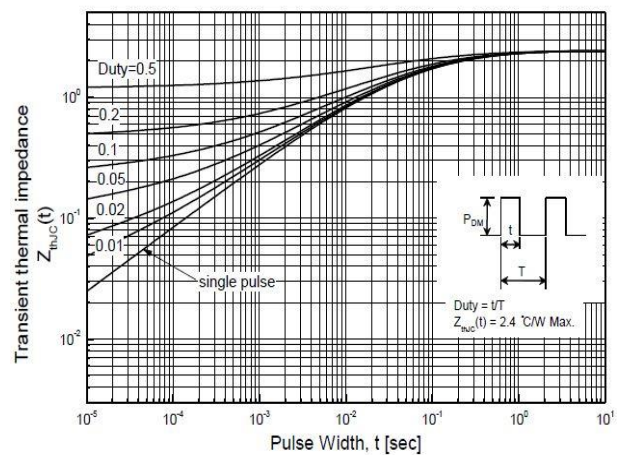
Capacitance vs. Drain-Source Voltage



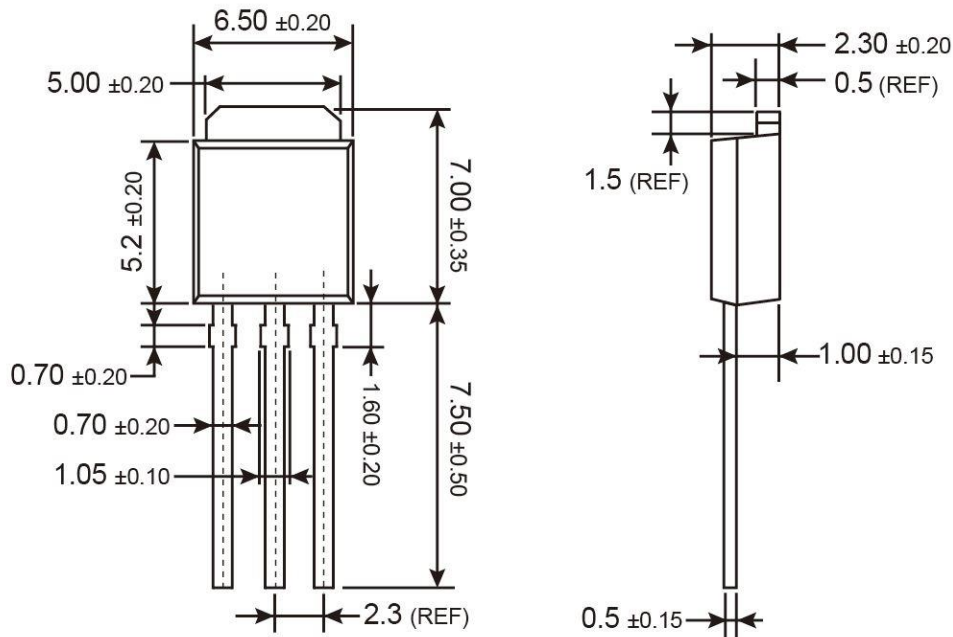
Maximum Safe Operating Area



Normalized Transient Impedance

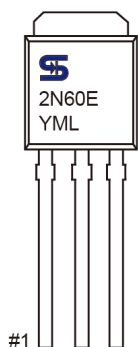


TO-251 Mechanical Drawing



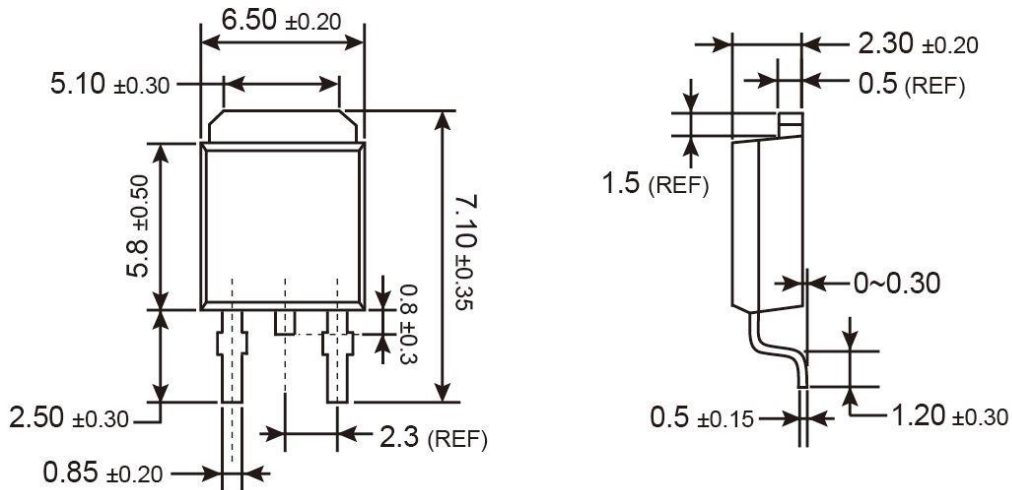
Unit: Millimeters

Marking Diagram



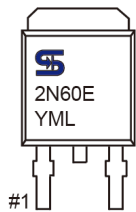
- Y** = Year Code
- M** = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

TO-252 Mechanical Drawing



Unit: Millimeters

Marking Diagram



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