

TSM060N03ECP

30V N-Channel Power MOSFET



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

Key Parameter Performance

Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	6
	$V_{GS} = 4.5V$	9
Q_g	11.1	nC

Features

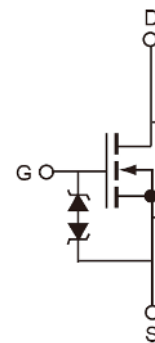
- Fast switching
- G-S ESD Protection Diode Embedded

Ordering Information

Ordering code	Package	Packing
TSM060N03ECP ROG	TO-252	2.5kpcs / 13" Reel

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

Block Diagram



N-Channel MOSFET with ESD protection

Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	70
		$T_C=100^\circ C$	44
Pulsed Drain Current ^(Note 1)	I_{DM}	280	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	88	mJ
Single Pulse Avalanche Current ^(Note 2)	I_{AS}	42	A
Total Power Dissipation	P_D	@ $T_C=25^\circ C$	54
		Derate above $T_C=25^\circ C$	0.43
Operating Junction Temperature	T_J	150	$^\circ C$
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ C$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	2.3	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ C/W$

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

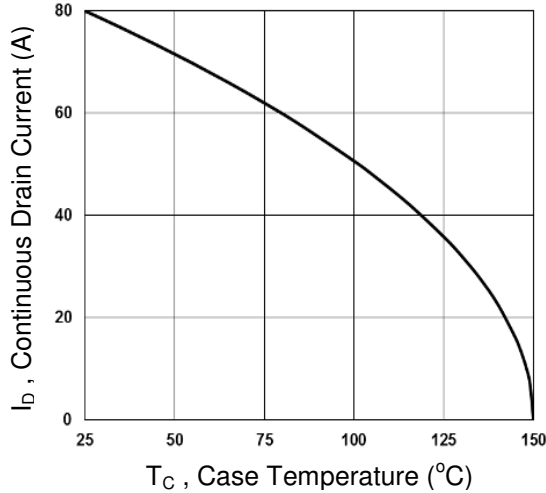
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 20A$	$R_{DS(ON)}$	--	4.8	6	m Ω
	$V_{GS} = 4.5V, I_D = 10A$		--	6.5	9	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.6	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
	$V_{DS} = 24V, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 10	μA
Forward Transconductance	$V_{DS} = 10V, I_D = 10A$	g_{fs}	--	12.5	--	S
Dynamic						
Total Gate Charge ^(Note 3,4)	$V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 4.5V$	Q_g	--	11.1	--	nC
Gate-Source Charge ^(Note 3,4)		Q_{gs}	--	1.85	--	
Gate-Drain Charge ^(Note 3,4)		Q_{gd}	--	6.8	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1\text{MHz}$	C_{iss}	--	1210	--	pF
Output Capacitance		C_{oss}	--	190	--	
Reverse Transfer Capacitance		C_{rss}	--	100	--	
Gate Resistance	$f = 1\text{MHz}$	R_g	--	2.5	--	Ω
Switching						
Turn-On Delay Time ^(Note 3,4)	$V_{DD}=15V, V_{GS}=10V,$ $R_G=3.3\Omega, I_D=-15A$	$t_{d(on)}$	--	7.5	--	ns
Turn-On Rise Time ^(Note 3,4)		t_r	--	14.5	--	
Turn-Off Delay Time ^(Note 3,4)		$t_{d(off)}$	--	35.2	--	
Turn-Off Fall Time ^(Note 3,4)		t_f	--	9.6	--	
Source-Drain Diode Ratings and Characteristic						
Continuous Drain-Source Diode		I_S	--	--	70	A
Pulse Drain-Source Diode		I_{SM}	--	--	280	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = 1A$	V_{SD}	--	--	1	V

Note:

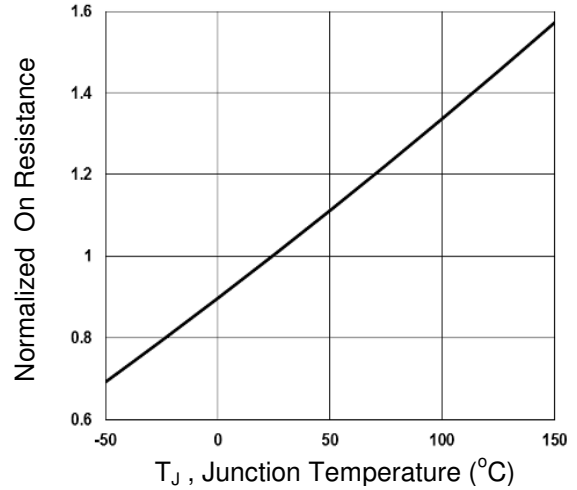
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=42A., R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width $\leq 300\mu s,$ duty cycle $\leq 2\%$
4. Essentially independent of operating temperature.

Electrical Characteristics Curve

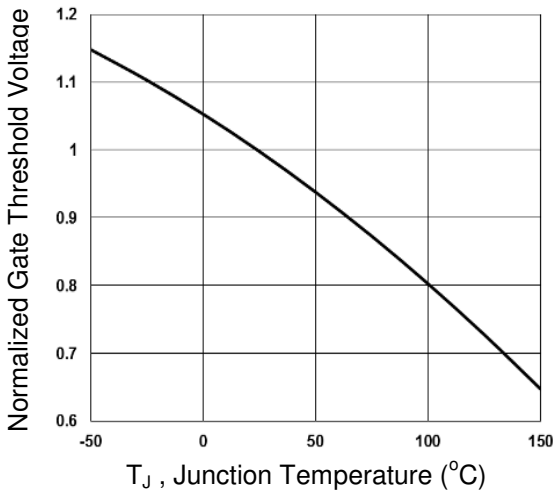
Continuous Drain Current vs. T_c



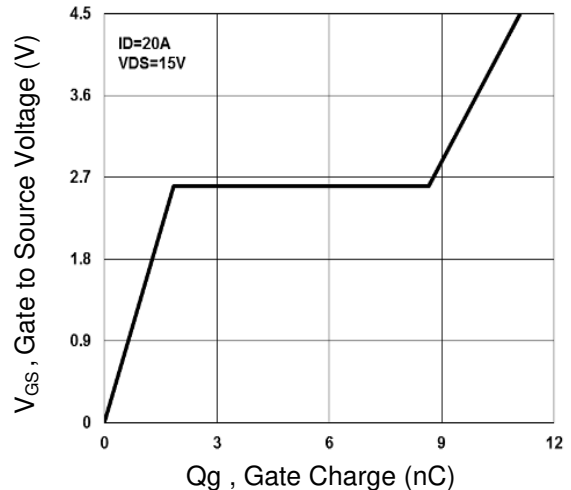
Normalized R_{DS(on)} vs. T_J



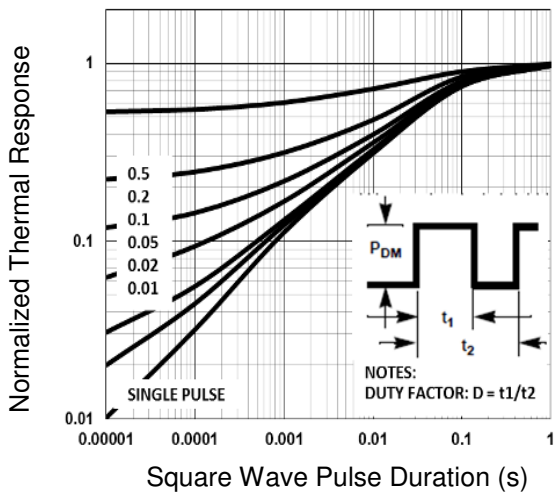
Normalized V_{th} vs. T_J



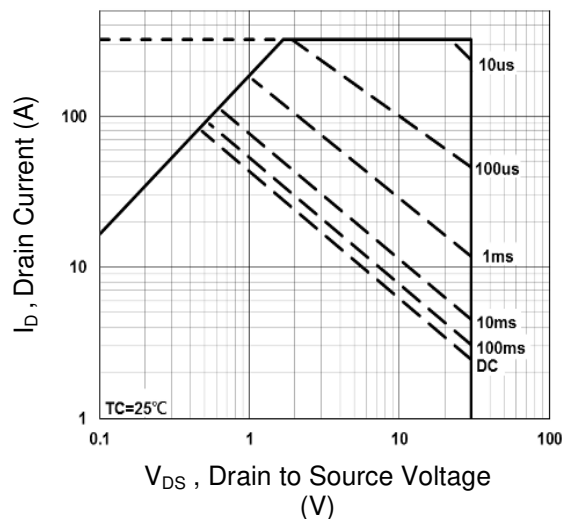
Gate Charge Waveform



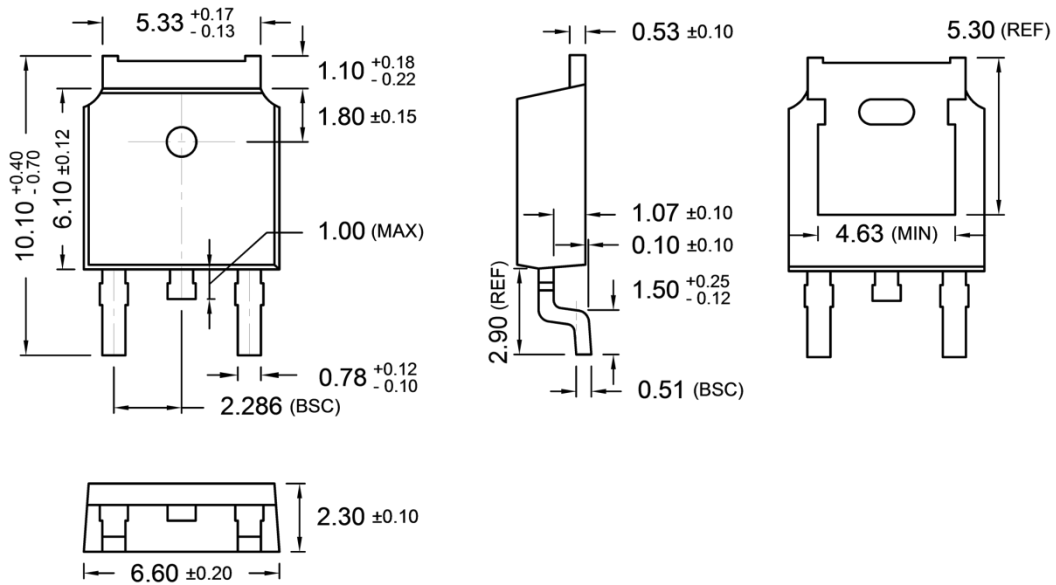
Normalized Transient Impedance



Maximum Safe Operation Area

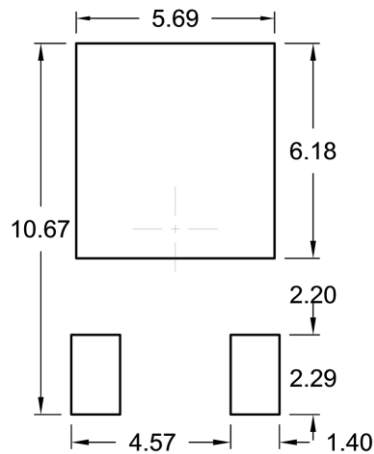


TO-252 Mechanical Drawing



Unit: Millimeters

SUGGESTED PAD LAYOUT (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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