

30V N-Channel Power MOSFET

30V, 50A, 9mΩ

FEATURES

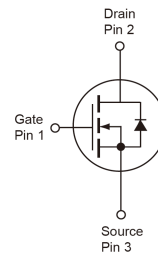
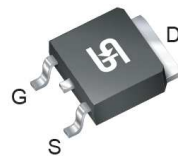
- Fast switching
- Halogen Free
- G-S ESD Protection Diode Embedded

APPLICATION

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
V_{DS}	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	9
	$V_{GS} = 4.5V$	14
Q_g	7.5	nC


TO-252 (DPAK)

Notes: Moisture sensitivity level: level 3. Per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ 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	$T_C = 25^\circ\text{C}$	50
		$T_C = 100^\circ\text{C}$	32
Pulsed Drain Current (Note 1)	I_{DM}	200	A
Total Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	40
		Derate above $T_C = 25^\circ\text{C}$	0.32
Single Pulsed Avalanche Energy (Note 2)	E_{AS}	45	mJ
Single Pulsed Avalanche Current (Note 2)	I_{AS}	30	A
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	3.1	$^{\circ}\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$

Notes: $R_{\theta JA}$ 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.

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

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static ^(Note3)						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	30	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	1.2	1.6	2.5	V
Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±10	μA
Zero Gate Voltage Drain Current	V _{DS} = 30V, V _{GS} = 0V	I _{DSS}	--	--	1	μA
	V _{DS} = 24V, T _J = 125°C		--	--	10	
Forward Transconductance	V _{DS} = 10V, I _D = 8A	g _{fs}	--	9.5	--	S
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 16A	R _{DS(ON)}	--	7.5	9	mΩ
	V _{GS} = 4.5V, I _D = 8A		--	9.6	14	
Dynamic ^(Note4)						
Total Gate Charge	V _{DS} = 15V, I _D = 20A, V _{GS} = 4.5V	Q _g	--	7.7	--	nC
Gate-Source Charge		Q _{gs}	--	1.9	--	
Gate-Drain Charge		Q _{gd}	--	2.8	--	
Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz	C _{iss}	--	680	--	pF
Output Capacitance		C _{oss}	--	150	--	
Reverse Transfer Capacitance		C _{rss}	--	70	--	
Gate Resistance	V _{GS} =0V,V _{DS} =0V, f=1MHz	R _g	--	2.7	--	Ω
Switching ^(Note5)						
Turn-On Delay Time	V _{DD} =15V , V _{GS} =10V , R _G =3.3Ω, I _D =-15A	t _{d(on)}	--	4.8	--	ns
Turn-On Rise Time		t _r	--	12.5	--	
Turn-Off Delay Time		t _{d(off)}	--	27.6	--	
Turn-Off Fall Time		t _f	--	8.2	--	
Source-Drain Diode ^(Note3)						
Forward Voltage	V _{GS} = 0V, I _S = 1A	V _{SD}	--	--	1	V
Continuous Drain-Source Diode	V _G =V _D =0V	I _S	--	--	50	A
Pulse Drain-Source Diode	Force Current	I _{SM}	--	--	200	A

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25\text{V}, V_{GS}=10\text{V}, L=0.1\text{mH}, I_{AS}=30\text{A}, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$.
3. Pulse test: $PW \leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. For DESIGN AID ONLY, not subject to production testing.
5. Switching time is essentially independent of operating temperature

ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM090N03ECP ROG	TO-252	2,500pcs / 13" Reel

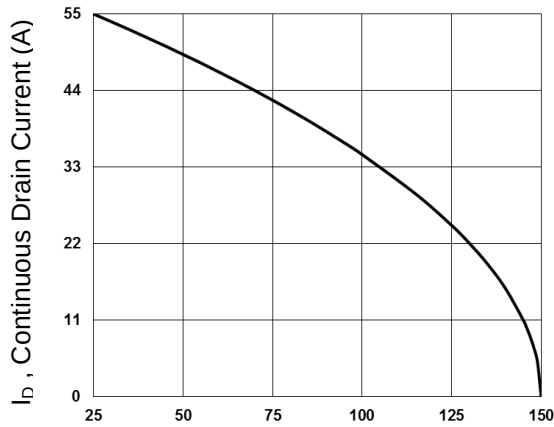
Note:

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

CHARACTERISTICS CURVES

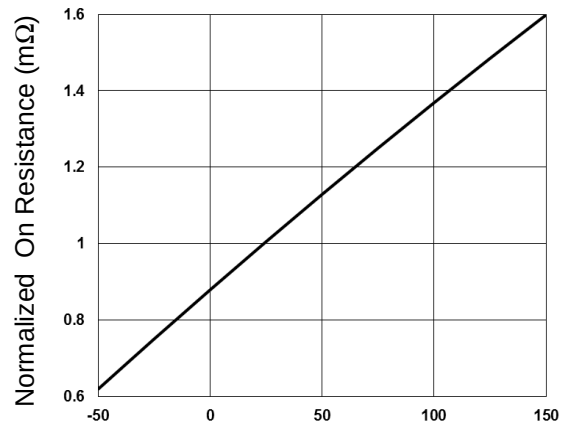
($T_C = 25^\circ\text{C}$ unless otherwise noted)

Continuous Drain Current vs. T_C



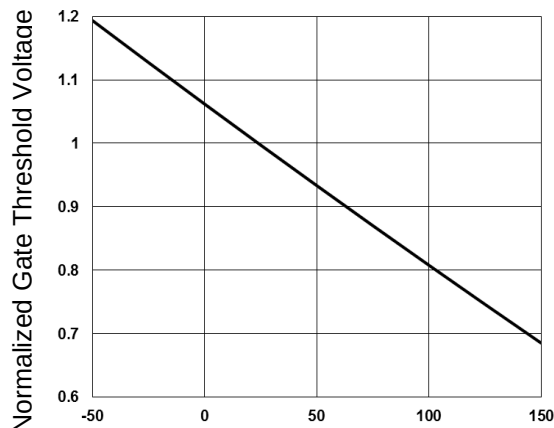
T_C , Case Temperature ($^\circ\text{C}$)

Normalized $R_{DS(on)}$ vs. T_J



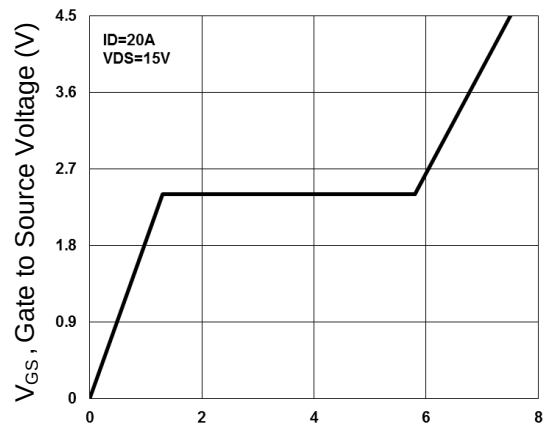
T_J , Junction Temperature ($^\circ\text{C}$)

Normalized V_{th} vs. T_J



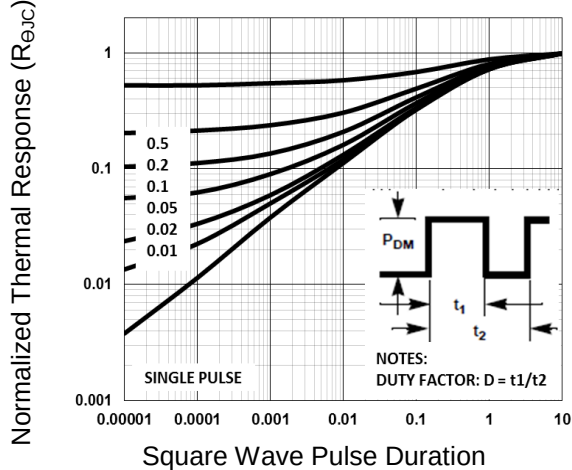
T_J , Junction Temperature ($^\circ\text{C}$)

Gate Charge Waveform

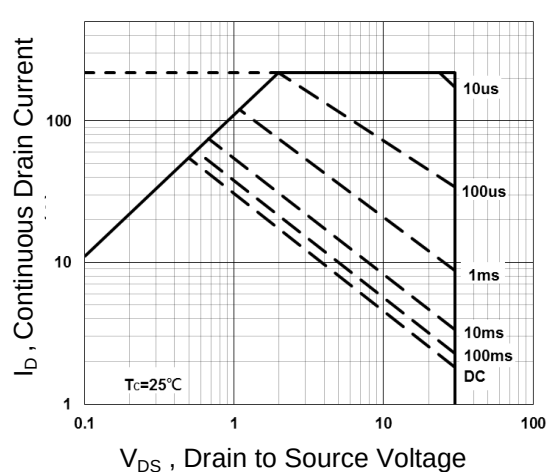


Q_g , Gate Charge (nC)

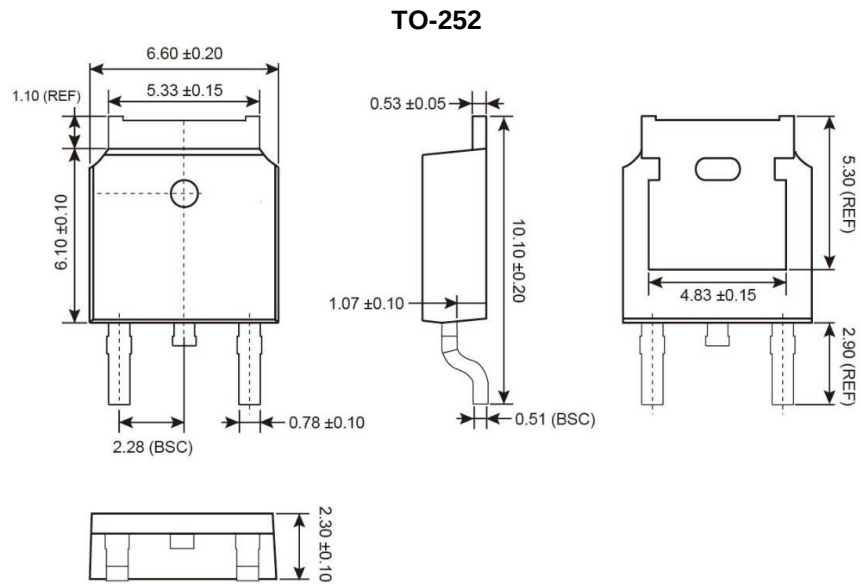
Normalized Transient Impedance



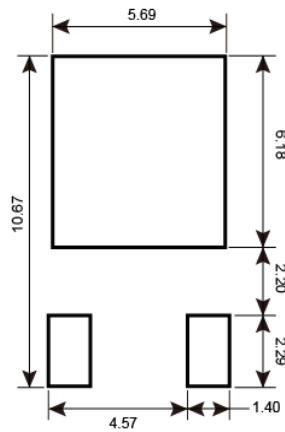
Maximum Safe Operation Area



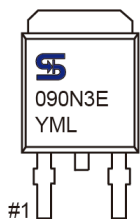
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



SUGGESTED PAD LAYOUT (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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