30V N-Channel Power MOSFET

30V, 50A, 9mΩ

FEATURES

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

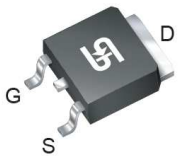
KEY PERFORMANCE PARAMETERS			
PARAMETER		**VALUE**	**UNIT**
V_{DS}		30	V
$R_{DS(on)}$ (max)	V_{GS} = 10V	9	mΩ
	V_{GS} = 4.5V	14	
Q_g		7.5	nC

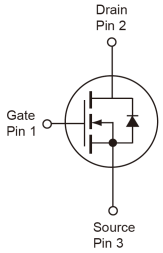
APPLICATION

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

Pb-Free RoHS COMPLIANT HALOGEN FREE

TO-252 (DPAK)





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

ABSOLUTE MAXIMUM RATINGS (T_C = 25°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	T_C = 25°C	I_D	50	A
	T_C = 100°C		32	
Pulsed Drain Current (Note 1)		I_{DM}	200	A
Total Power Dissipation	T_C = 25°C	P_D	40	W
	Derate above T_C = 25°C		0.32	W/°C
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	°C
Storage Temperature Range		T_{STG}	- 55 to +150	°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\Theta JC}$	3.1	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	62	°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°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 = 125ºC		--	--	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 Force Current	I_S	--	--	50	A
Pulse Drain-Source Diode		I_{SM}	--	--	200	A

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=30A, R_G=25Ω, Starting T_J=25℃.
3. Pulse test: PW ≤ 300μs, duty cycle ≤ 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

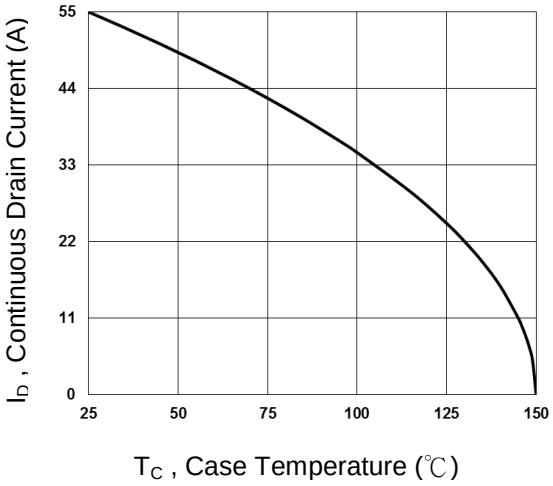
Note:

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

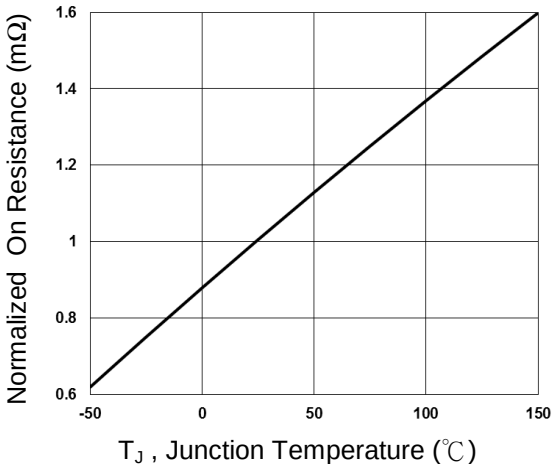
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

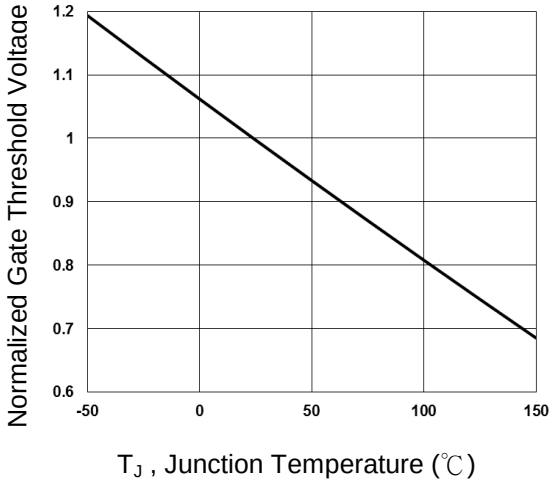
Continuous Drain Current vs. Tc



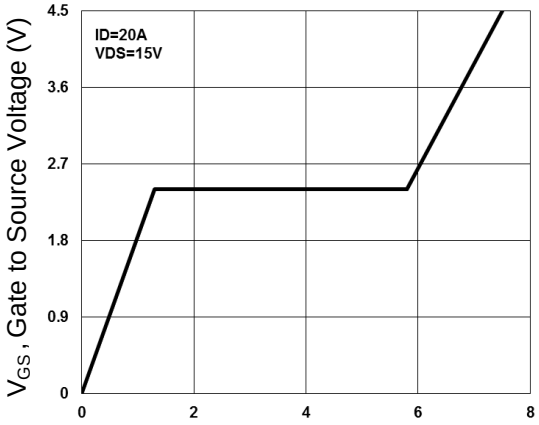
Normalized RDSON vs. T_J



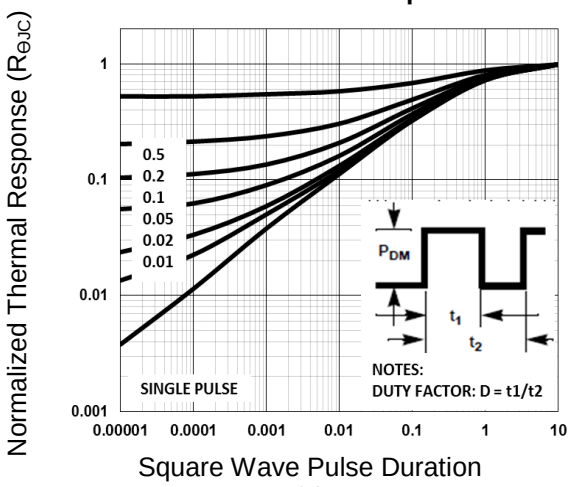
Normalized V_{th} vs. T_J



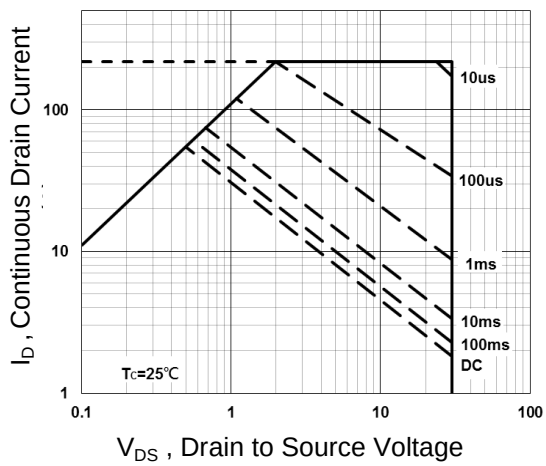
Gate Charge Waveform



Normalized Transient Impedance

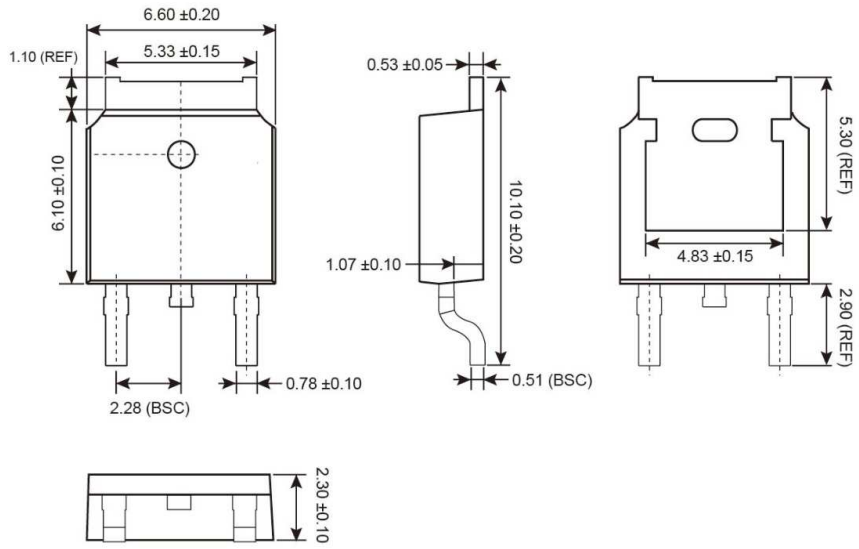


Maximum Safe Operation Area

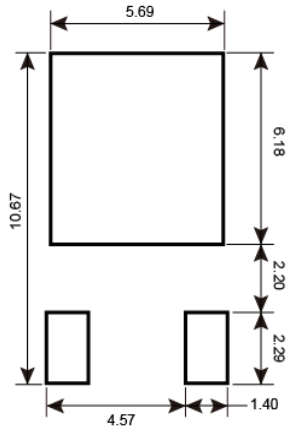


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

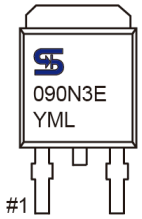
TO-252



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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