Dual P-Channel MOSFET

-60V, -12A, 68mΩ

FEATURES

- Fast switching
- Low thermal resistance package
- Low profile package
- Pb-free plating
- RoHS compliant
- Halogen-free package

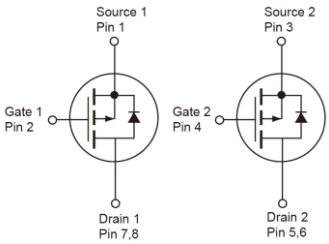
APPLICATION

- Power Supply
- Motor control

KEY PERFORMANCE PARAMETERS			
PARAMETER		**VALUE**	**UNIT**
V_{DS}		-60	V
$R_{DS(on)}$ (max)	V_{GS} = -10V	68	mΩ
	V_{GS} = -4.5V	110	
Q_g		16.4	nC

Pb-Free RoHS COMPLIANT HALOGEN FREE

PDFN56 Dual



Dual P-Channel MOSFET

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	-12	A
	T_C = 100°C		-8	
Pulsed Drain Current (Note 2)		I_{DM}	-48	A
Total Power Dissipation @ T_C = 25°C		P_{DTOT}	3.5	W
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	7.2	mJ
Single Pulsed Avalanche Current (Note 3)		I_{AS}	12	A
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150	°C

THERMAL PERFORMANCE			
PARAMETER	**SYMBOL**	**LIMIT**	**UNIT**
Junction to Case Thermal Resistance	$R_{\Theta JC}$	4.5	°C/W
Junction to Ambient Thermal Resistance	$R_{\Theta JA}$	85	°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_A = 25°C unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Static (Note 4)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250μA	BV_{DSS}	-60	--	--	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}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = -60V, V_{GS} = 0V	I_{DSS}	--	--	-1	μA
	V_{DS} = -48V, Tc = 125ºC		--	--	-10	
Drain-Source On-State Resistance	V_{GS} = -10V, I_D = -6A	$R_{DS(on)}$	--	54	68	mΩ
	V_{GS} = -4.5V, I_D = -3A		--	90	110	
Forward Transconductance	V_{DS} = -10V, I_D = -6A	g_{fs}	--	8.5	--	S
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = -30V, I_D = -6A, V_{GS} = -10V	Q_g	--	16.4	--	nC
Gate-Source Charge		Q_{gs}	--	2.8	--	
Gate-Drain Charge		Q_{gd}	--	3.6	--	
Input Capacitance	V_{DS} = -30V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	870	--	pF
Output Capacitance		C_{oss}	--	70	--	
Reverse Transfer Capacitance		C_{rss}	--	42	--	
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = -30V, I_D = -1A, R_{GEN} =6Ω	$t_{d(on)}$	--	8.3	--	ns
Turn-On Rise Time		t_r	--	42.4	--	
Turn-Off Delay Time		$t_{d(off)}$	--	64.6	--	
Turn-Off Fall Time		t_f	--	16.4	--	
Source-Drain Diode (Note 4)						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I_S	--	--	-12	A
Maximum Pulse Drain-Source Diode Forward Current		I_{SM}	--	--	-48	A
Diode-Source Forward Voltage	V_{GS} = 0V, I_S = -1A	V_{SD}	--	--	-1	V

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 0.1mH, I_{AS} = -12A, V_{DD} = -25V, R_G = 25Ω, Starting T_J = 25°C
4. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION (EXAMPLE)

PART NO.	PACKAGE	PACKING
TSM680P06DPQ56 RLG	PDFN56	2,500pcs / 13”Reel

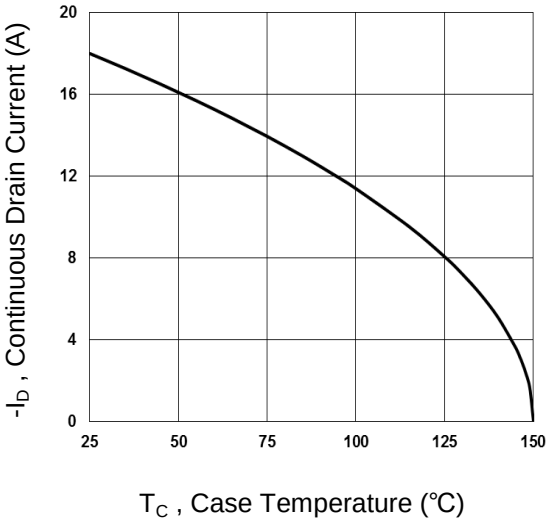
Note:

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

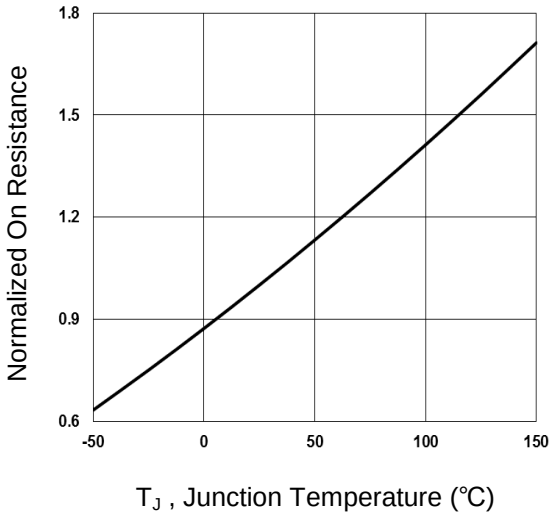
CHARACTERISTICS CURVES

(T_C = 25°C unless otherwise noted)

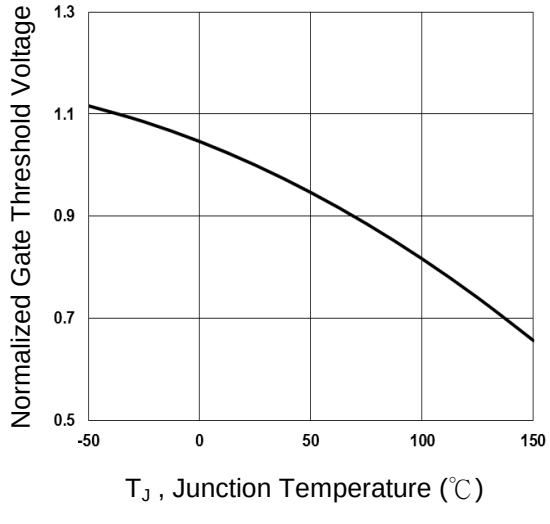
Continuous Drain Current vs. T_C



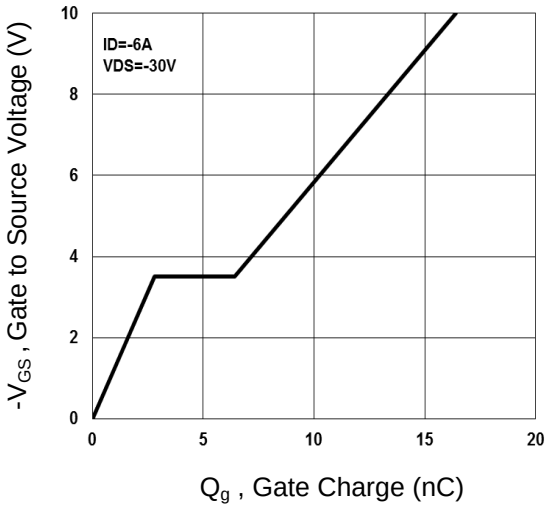
Normalized $R_{DS(ON)}$ vs. T_J



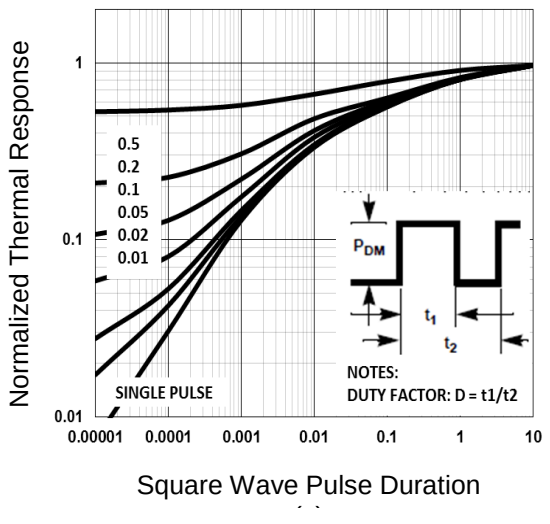
Normalized Vth vs. T_J



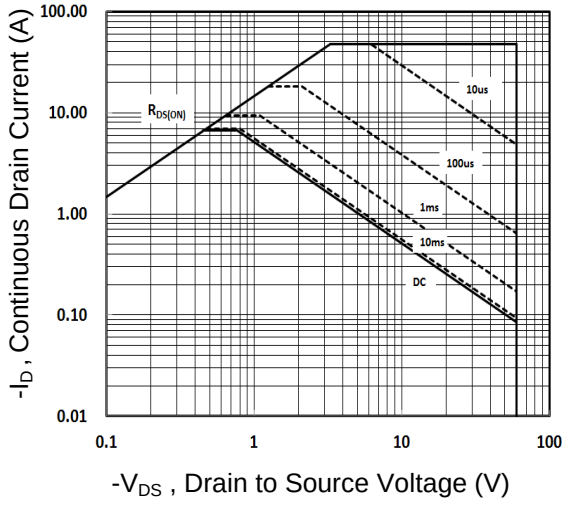
Gate Charge Waveform



Normalized Transient Impedance

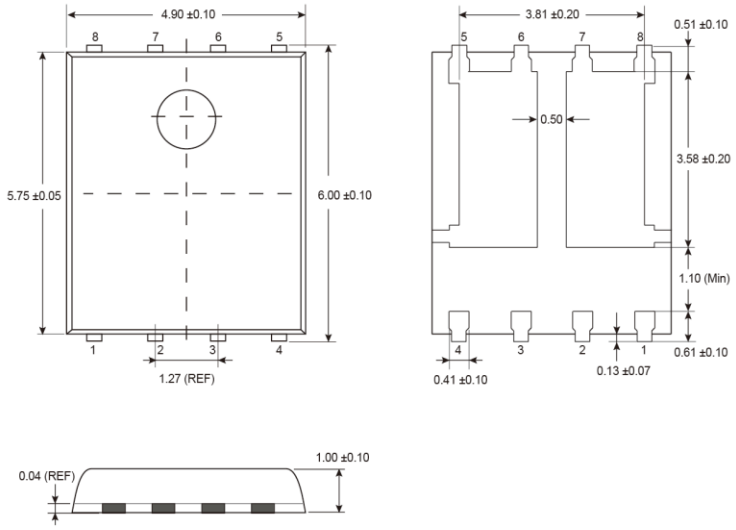


Maximum Safe Operation Area

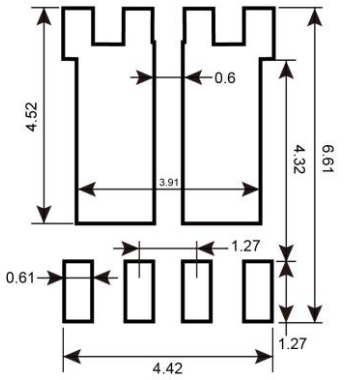


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

PDFN56 Dual



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 (1~9, A~Z)

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.