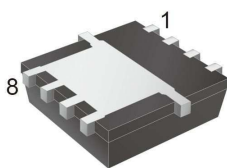


PDFN56



Pin Definition:

- | | |
|-----------|----------|
| 1. Source | 8. Drain |
| 2. Source | 7. Drain |
| 3. Source | 6. Drain |
| 4. Gate | 5. Drain |

Key Parameter Performance

Parameter	Value	Unit
V_{DS}	60	V
$R_{DS(on)}(max)$	5.2	mΩ
Q_g	50	nC

Features

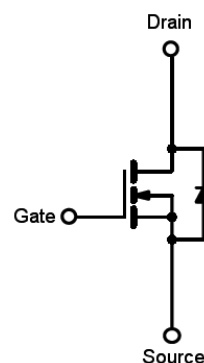
- Low On-Resistance
- Low Input Capacitance
- Low Gate Charge

Ordering Information

Part No.	Package	Packing
TSM052N06PQ56 RLG	PDFN56	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

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^(Note 3)	$T_C=25^{\circ}C$	100	A
	$T_A=25^{\circ}C$	17	
Drain Current-Pulsed ^(Note 1)	I_{DM}	350	A
Single Pulse Avalanche Energy' L=0.5mH	E_{AS}	169	mJ
Maximum Power Dissipation ^(Note 2)	$T_C=25^{\circ}C$	83	W
	$T_A=25^{\circ}C$	3.6	
Storage Temperature Range	T_{STG}	-55 to +150	$^{\circ}C$
Operating Junction Temperature Range	T_J	-55 to +150	$^{\circ}C$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1.5	$^{\circ}C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	35	$^{\circ}C/W$

Electrical Specifications (T_J=25°C unless otherwise noted)

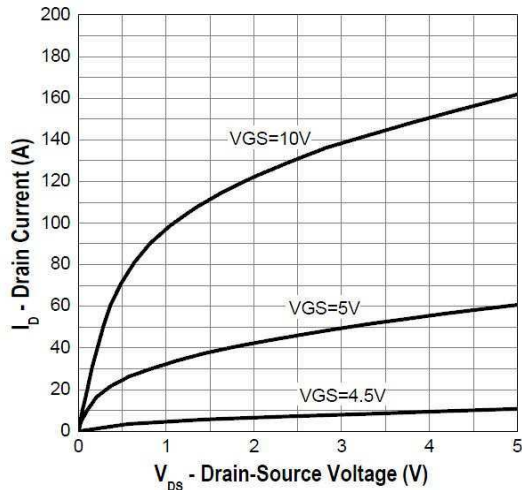
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	60	--	--	V
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 20A	R _{DS(ON)}	--	4.2	5.2	mΩ
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	2	3	4	V
Zero Gate Voltage Drain Current	V _{DS} = 48V, V _{GS} = 0V	I _{DSS}	--	--	1	μA
Gate Body Leakage	V _{GS} = ±25V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Dynamic						
Total Gate Charge	V _{DS} = 30V, I _D = 20A, V _{GS} = 10V	Q _g	--	50	--	nC
Gate-Source Charge		Q _{gs}	--	15	--	
Gate-Drain Charge		Q _{gd}	--	2.5	--	
Input Capacitance	V _{DS} = 30V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	3686	--	pF
Output Capacitance		C _{oss}	--	357	--	
Reverse Transfer Capacitance		C _{rss}	--	124	--	
Switching						
Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 30V, R _G = 3Ω, I _D = 20A	t _{d(on)}	--	12	--	ns
Turn-On Rise Time		t _r	--	4	--	
Turn-Off Delay Time		t _{d(off)}	--	50	--	
Turn-Off Fall Time		t _f	--	6	--	
Drain-Source Diode Characteristics and Maximum Rating						
Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =20A	V _{SD}	--	0.8	1.3	V
Reverse Recovery Time	I _S = 20A, di/dt = 100A/μs	t _{rr}	--	22	--	ns
Reverse Recovery Charge		Q _{rr}	--	120	--	nC

Notes:

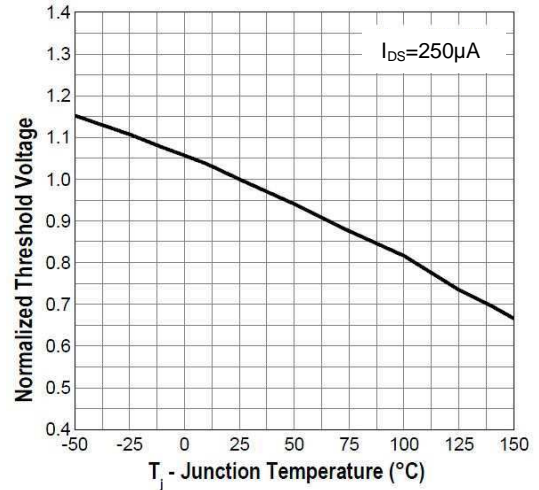
- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. R_{θJA} is guaranteed by design while R_{θCA} is determined by the user's board design. R_{θJA} shown below for single device operation on FR-4 PCB in still air.
- The maximum current rating is limited by package.

Electrical Characteristics Curves

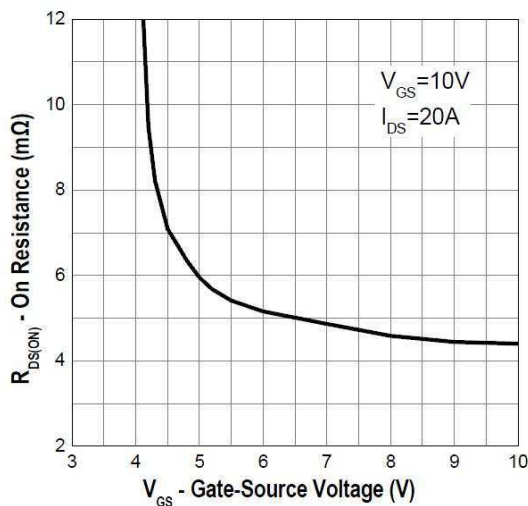
Output Characteristics



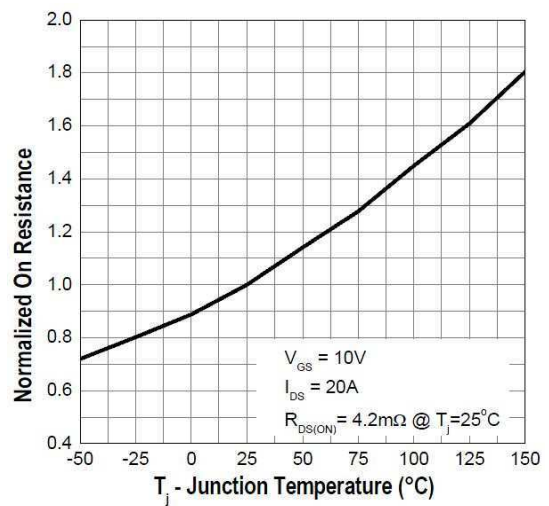
Gate Threshold Voltage



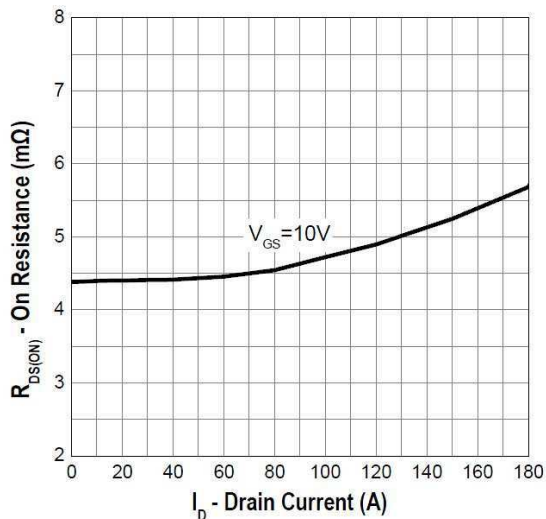
Gate Source On Resistance



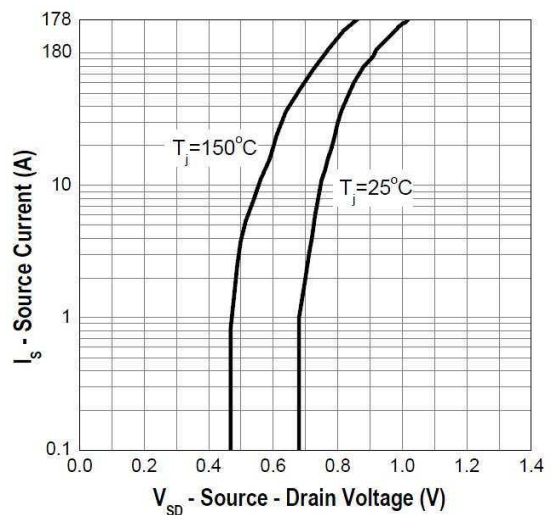
Drain-Source On Resistance



Drain-Source On-Resistance

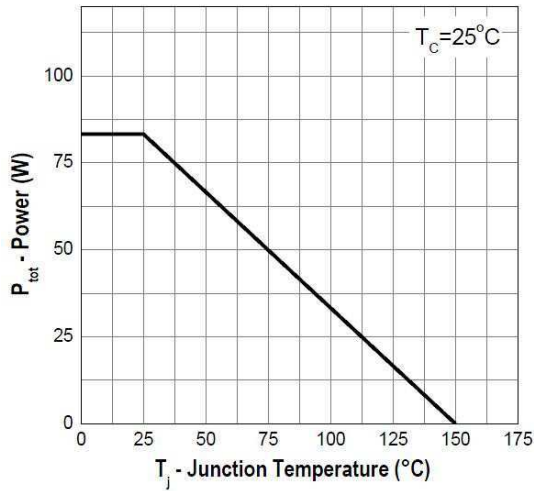


Source-Drain Diode Forward Voltage

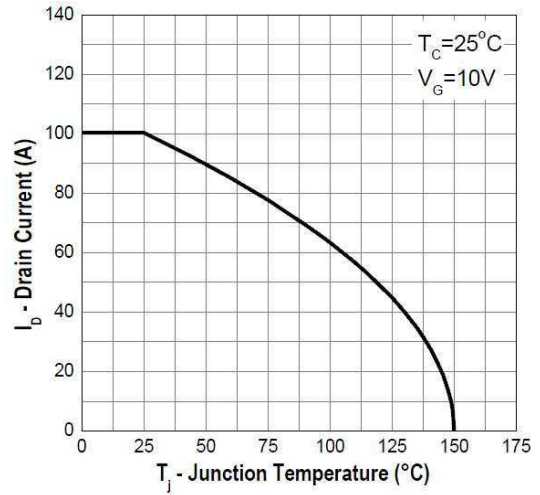


Electrical Characteristics Curves

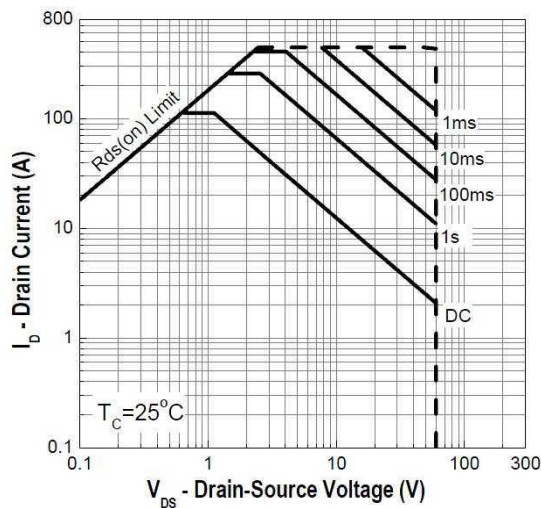
Power Derating



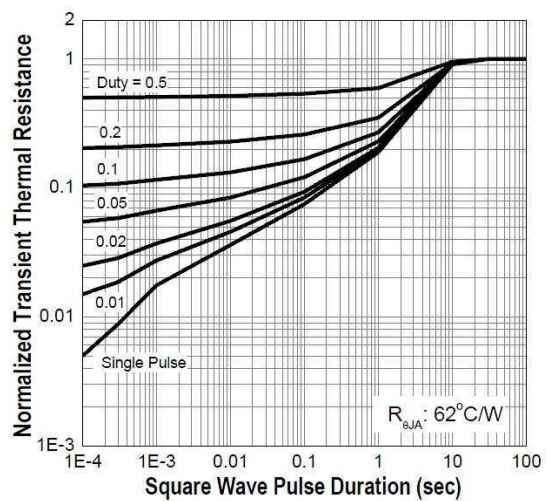
Drain Current vs. Junction Temperature



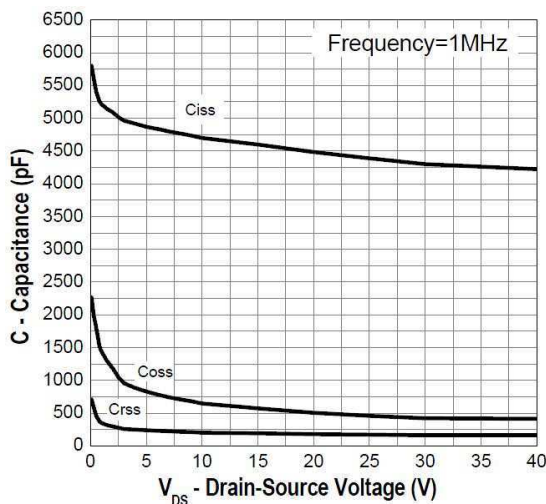
Safe Operation Area



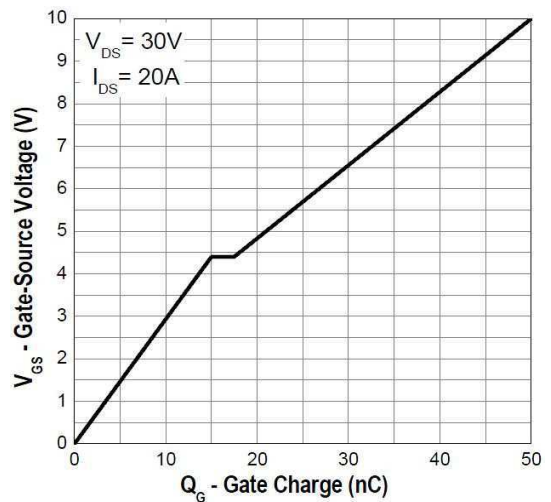
Transient Thermal Impedance



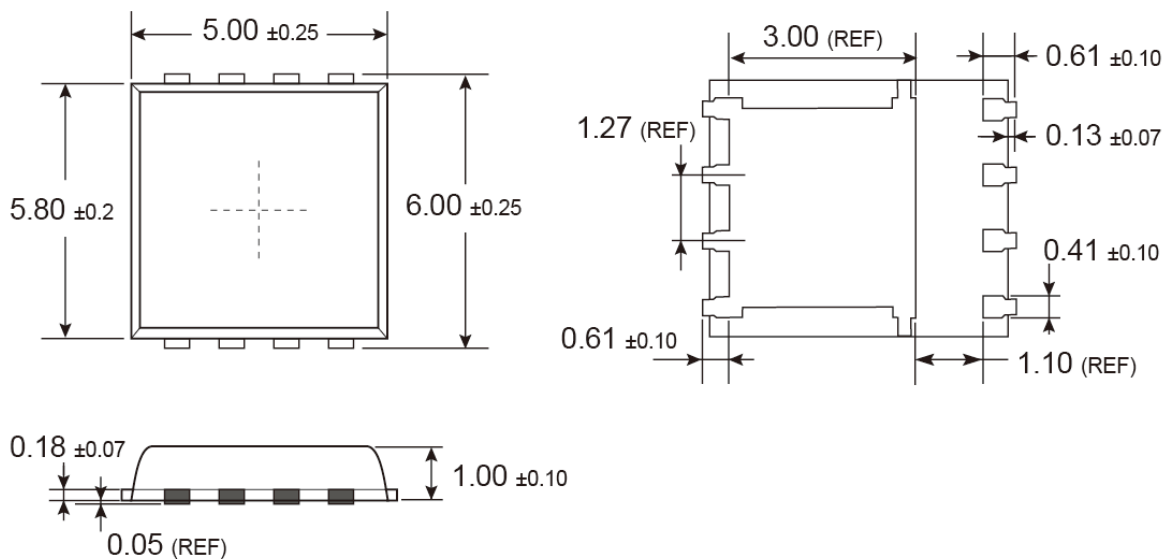
Capacitance



Gate Charge

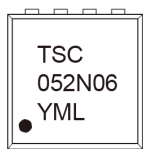


PDFN56 Mechanical Drawing



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

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