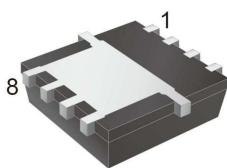


PDFN56



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}	100	V
$R_{DS(on)}(max)$	12	m Ω
Q_g	145	nC

Features

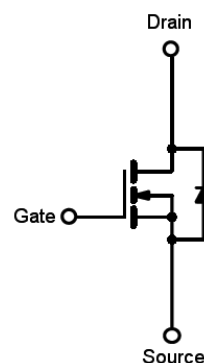
- Low On-Resistance
- Low Input Capacitance
- Low Gate Charge

Ordering Information

Part No.	Package	Packing
TSM120N10PQ56 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 ($T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^(Note 3)	I_D	$T_C=25^\circ\text{C}$	58
		$T_A=25^\circ\text{C}$	16.1
Drain Current-Pulsed ^(Note 1)	I_{DM}	150	A
Single Pulse Avalanche Energy: L=0.5mH	E_{AS}	156	mJ
Maximum Power Dissipation ^(Note 2)	P_D	$T_C=25^\circ\text{C}$	36
		$T_A=25^\circ\text{C}$	2
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1.2	$^\circ\text{C/W}$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$

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

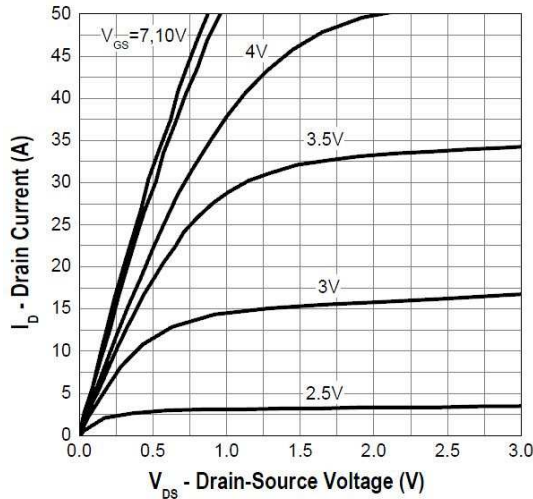
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	100	--	--	V
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 30A	R _{DS(ON)}	--	10	12	mΩ
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	2	3	4	V
Zero Gate Voltage Drain Current	V _{DS} = 80V, V _{GS} = 0V	I _{DSS}	--	--	1	μA
Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Dynamic						
Total Gate Charge	V _{DS} = 50V, I _D = 30A, V _{GS} = 10V	Q _g	--	145	--	nC
Gate-Source Charge		Q _{gs}	--	25	--	
Gate-Drain Charge		Q _{gd}	--	43	--	
Input Capacitance	V _{DS} = 30V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	3902	--	pF
Output Capacitance		C _{oss}	--	251	--	
Reverse Transfer Capacitance		C _{rss}	--	93	--	
Switching						
Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 50V, R _G = 3Ω, I _D = 30A	t _{d(on)}	--	27	--	ns
Turn-On Rise Time		t _r	--	13	--	
Turn-Off Delay Time		t _{d(off)}	--	15	--	
Turn-Off Fall Time		t _f	--	42	--	
Drain-Source Diode Characteristics and Maximum Rating						
Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	V _{SD}	--	--	1.3	V
Reverse Recovery Time	I _S = 30A, di/dt = 100A/μs	t _{rr}	--	65	--	ns
Reverse Recovery Charge		Q _{rr}	--	175	--	nC

Notes:

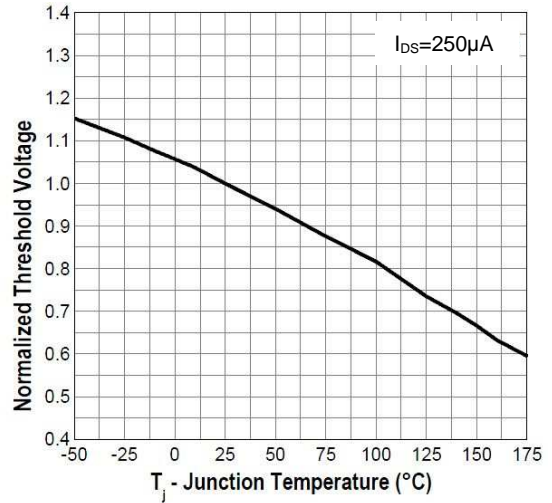
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. R_{θJA} is guaranteed by design while R_{θCA} is determined by the user's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

Electrical Characteristics Curves

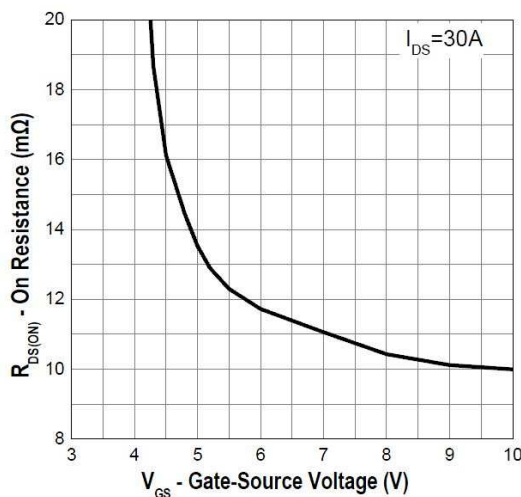
Output Characteristics



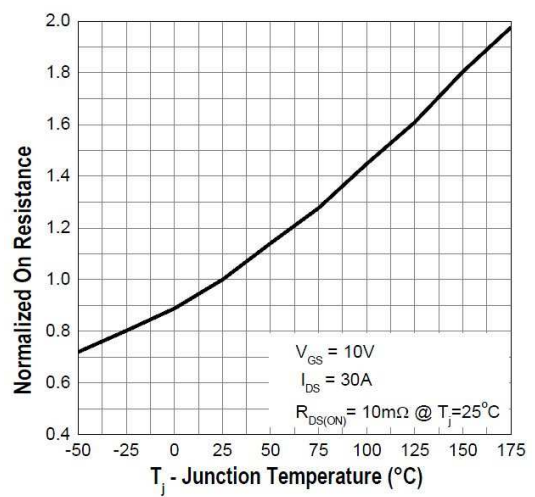
Gate Threshold Voltage



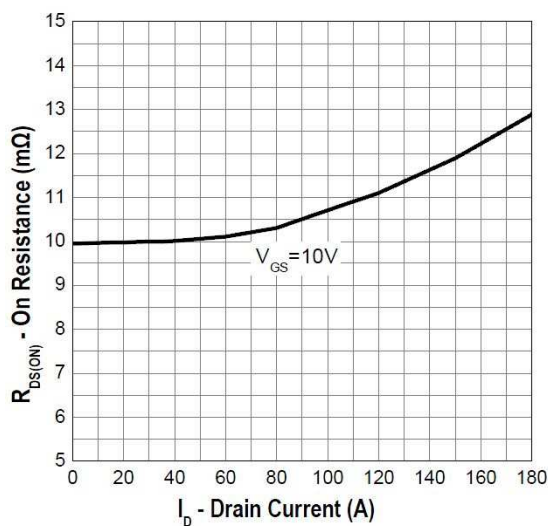
Gate Source On Resistance



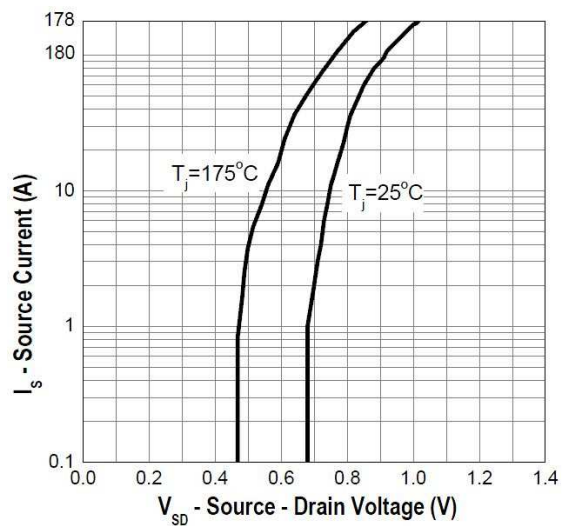
Drain-Source On Resistance



Drain-Source On-Resistance

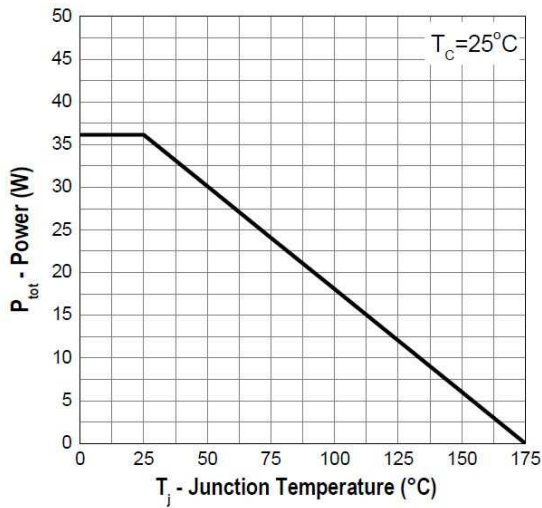


Source-Drain Diode Forward Voltage

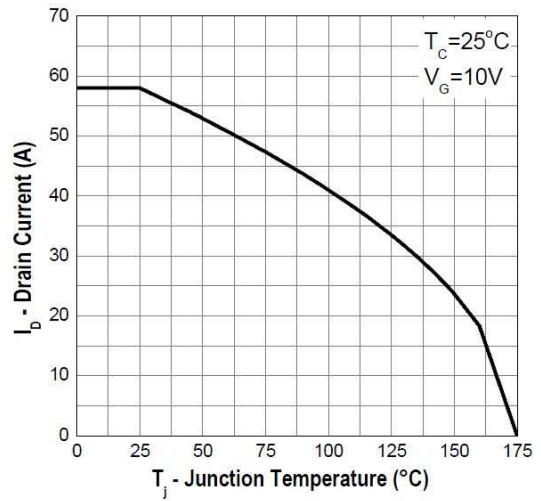


Electrical Characteristics Curves

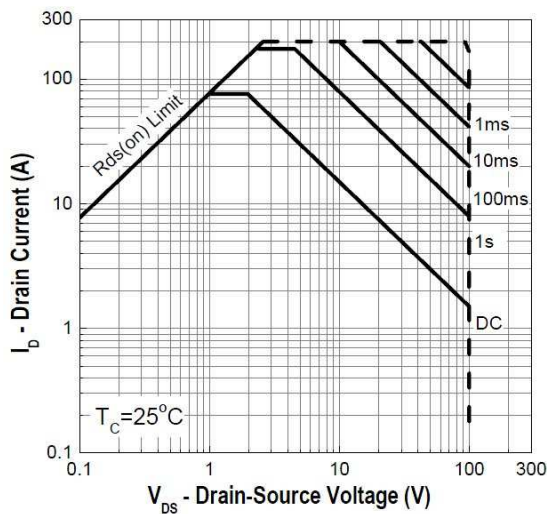
Power Derating



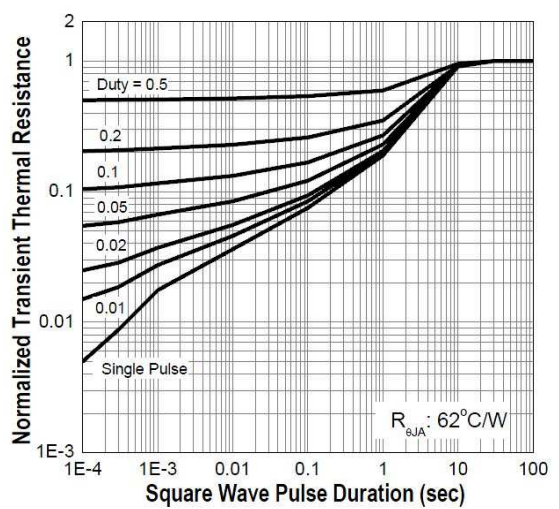
Drain Current vs. Junction Temperature



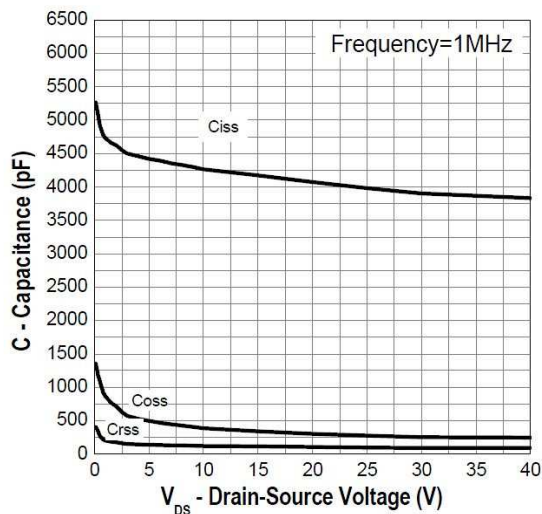
Safe Operation Area



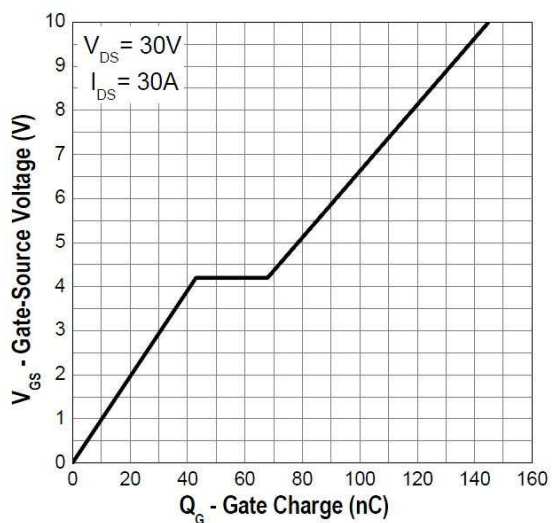
Transient Thermal Impedance



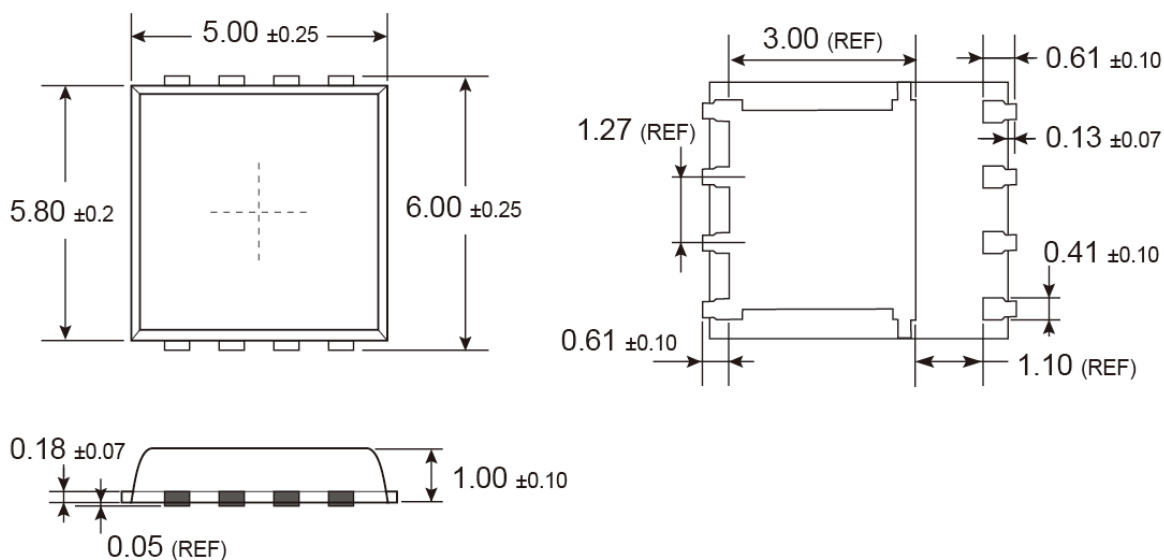
Capacitance



Gate Charge

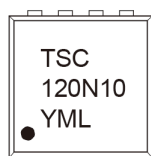


PDFN56 Mechanical Drawing



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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