Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

N- and P-Channel 60V (D-S) Power MOSFET

FEATURES

- Low $R_{DS(ON)}$ to minimize conductive losses
- Low gate charge for fast power switching
- 100% UIS and R_g tested
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

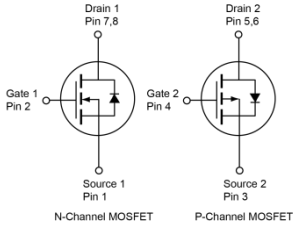
APPLICATIONS

- DC-DC Converters
- Power Routing
- Motor Drives

KEY PERFORMANCE PARAMETERS				
PARAMETER		**TYPE**	**VALUE**	**UNIT**
V_{DS}		N-ch	60	V
		P-ch	-60	
$R_{DS(on)}$ (max)	V_{GS} = 10V	N-ch	34	mΩ
	V_{GS} = 4.5V		40	
	V_{GS} = -10V	P-ch	68	
	V_{GS} = -4.5V		110	
Q_g		N-ch	10.3	nC
		P-ch	9.5	

Pb-Free RoHS COMPLIANT HALOGEN FREE

PDFN56 Dual



Note: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)					
PARAMETER		**SYMBOL**	**N-ch**	**P-ch**	**UNIT**
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	24	-18	A
	T_A = 25°C		5.4	-4	
Pulsed Drain Current		I_{DM}	96	-72	A
Single Pulse Avalanche Current (Note 2)		I_{AS}	12.7	-12.7	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	24	24	mJ
Total Power Dissipation	T_C = 25°C	P_D	40	40	W
	T_C = 125°C		8.1	8.1	
Total Power Dissipation	T_A = 25°C	P_D	2	2	W
	T_A = 125°C		0.4	0.4	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	- 55 to +150		°C

THERMAL PERFORMANCE			
PARAMETER	**SYMBOL**	**LIMIT**	**UNIT**
Thermal Resistance – Junction to Case	$R_{\Theta JC}$	3.1	°C/W
Thermal Resistance – Junction to Ambient	$R_{\Theta JA}$	61	

Thermal Performance Note: $R_{\Theta JA}$ 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.

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)							
PARAMETER	**CONDITIONS**	**SYMBOL**	**TYPE**	**MIN**	**TYP**	**MAX**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	N-ch	60	--	--	V
	V_{GS} = 0V, I_D = -250μA		P-ch	-60	--	--	
Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	$V_{GS(TH)}$	N-ch	1.2	1.7	2.5	V
	V_{GS} = V_{DS}, I_D = -250μA		P-ch	-1.2	-1.5	-2.5	
Gate-Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	N-ch	--	--	±100	nA
	V_{GS} = ±20V, V_{DS} = 0V		P-ch	--	--	±100	nA
Drain-Source Leakage Current	V_{GS} = 0V, V_{DS} = 60V	I_{DSS}	N-ch	--	--	1	μA
	V_{GS} = 0V, V_{DS} = 60V T_J = 125°C			--	--	100	
	V_{GS} = 0V, V_{DS} = -60V		P-ch	--	--	-1	
	V_{GS} = 0V, V_{DS} = -60V T_J = 125°C			--	--	-100	
Drain-Source On-State Resistance (Note 3)	V_{GS} = 10V, I_D = 5.4A	$R_{DS(on)}$	N-ch	--	28	34	mΩ
	V_{GS} = 4.5V, I_D = 4.9A			--	33	40	
	V_{GS} = -10V, I_D = -4A		P-ch	--	57	68	
	V_{GS} = -4.5V, I_D = -3.2A			--	73	110	
Forward Transconductance (Note 3)	V_{DS} = 5V, I_D = 5.4A	g_{fs}	N-ch	--	19	--	S
	V_{DS} = -5V, I_D = -4A		P-ch	--	11	--	
Dynamic (Note 4)							
Total Gate Charge	N-ch V_{DS} = 30V, I_D = 5.4A P-ch V_{DS} = -30V, I_D = -4A	$Q_{g(VGS=10V)}$	N-ch	--	20.8	--	nC
		$Q_{g(VGS=-10V)}$	P-ch	--	18.1	--	
Total Gate Charge	N-ch V_{DS} = 30V, I_D = 4.9A P-ch V_{DS} = -30V, I_D = -3.2A	$Q_{g(VGS=4.5V)}$	N-ch	--	10.3	--	
		$Q_{g(VGS=-4.5V)}$	P-ch	--	9.5	--	
Gate-Source Charge		Q_{gs}	N-ch	--	3.9	--	
			P-ch	--	2.6	--	
Gate-Drain Charge		Q_{gd}	N-ch	--	4.2	--	
			P-ch	--	4.8	--	
Input Capacitance	N-ch V_{GS} = 0V, V_{DS} = 30V f = 1.0MHz P-ch V_{GS} = 0V, V_{DS} = -30V f = 1.0MHz	C_{iss}	N-ch	--	1159	--	pF
			P-ch	--	930	--	
Output Capacitance		C_{oss}	N-ch	--	59	--	
			P-ch	--	65	--	
Reverse Transfer Capacitance		C_{rss}	N-ch	--	15	--	
			P-ch	--	26	--	
Gate Resistance	f = 1.0MHz	R_g	N-ch	0.6	2	4	Ω
			P-ch	4.5	15	30	

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)							
PARAMETER	**CONDITIONS**	**SYMBOL**	**TYPE**	**MIN**	**TYP**	**MAX**	**UNIT**
Switching (Note 4)							
Turn-On Delay Time	N-ch V_{GS} = 10V, V_{DS} = 30V, I_D = 5.4A, R_G = 2Ω P-ch V_{GS} = -10V, V_{DS} = -30V, I_D = -4A, R_G = 2Ω	$t_{d(on)}$	N-ch	--	7.4	--	ns
			P-ch	--	4	--	
Turn-On Rise Time		t_r	N-ch	--	25	--	
			P-ch	--	28	--	
Turn-Off Delay Time		$t_{d(off)}$	N-ch	--	18	--	
			P-ch	--	44	--	
Turn-Off Fall Time		t_f	N-ch	--	18	--	
			P-ch	--	44	--	
Source-Drain Diode							
Forward Voltage (Note 3)	V_{GS} = 0V, I_S = 5.4A	V_{SD}	N-ch	--	--	1	V
	V_{GS} = 0V, I_S = -4A		P-ch	--	--	-1	
Reverse Recovery Time	N-ch I_S = 5.4A, dI/dt = 100A/μs P-ch I_S = -4A, dI/dt = 100A/μs	t_{rr}	N-ch	--	16	--	ns
			P-ch	--	13	--	
Reverse Recovery Charge		Q_{rr}	N-ch	--	11	--	nC
			P-ch	--	7.8	--	

Notes:

1. Silicon limited current only.
2. N-ch : L = 0.3mH, V_{GS} = 10V, V_{DD} = 25V, R_G = 25Ω, I_{AS} = 12.7A, Starting T_J = 25°C
   P-ch : L = 0.3mH, V_{GS} = -10V, V_{DD} = -25V, R_G = 25Ω, I_{AS} = -12.7A, Starting T_J = 25°C
3. Pulse test: Pulse Width ≤ 300μs, duty cycle ≤ 2%.
4. Switching time is essentially independent of operating temperature.

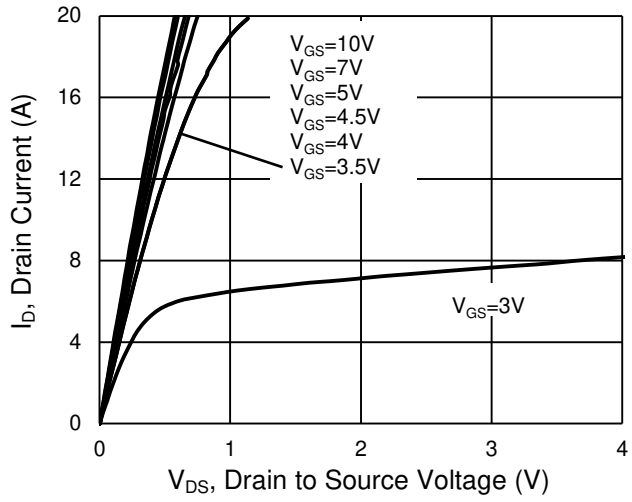
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM6502CR RLG	PDFN56 Dual	2,500pcs / 13” Reel

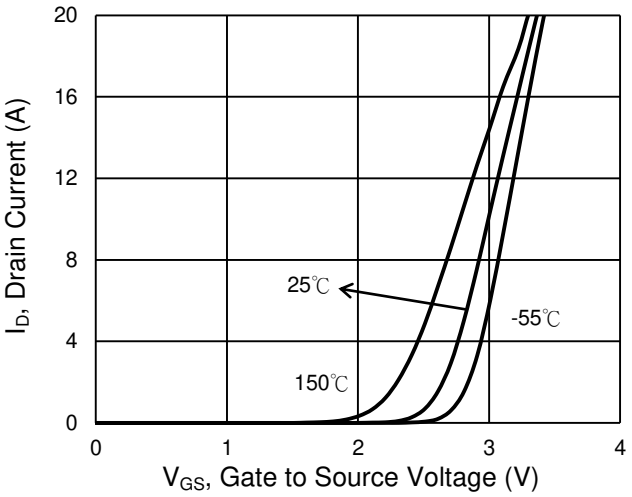
CHARACTERISTICS CURVES (N-Channel)

(T_A = 25°C unless otherwise noted)

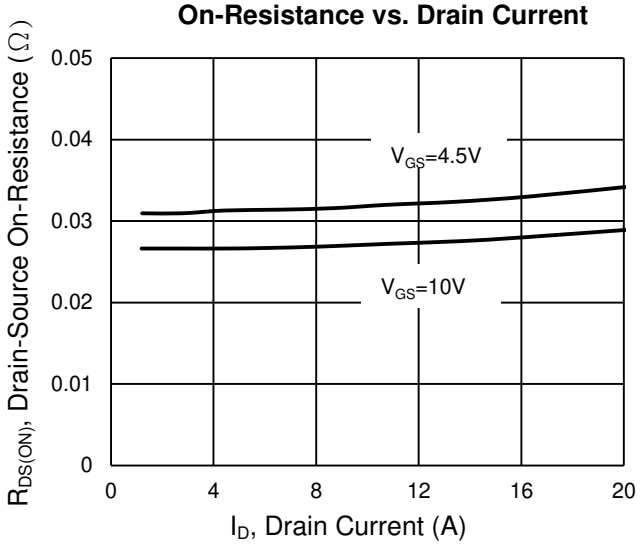
Output Characteristics



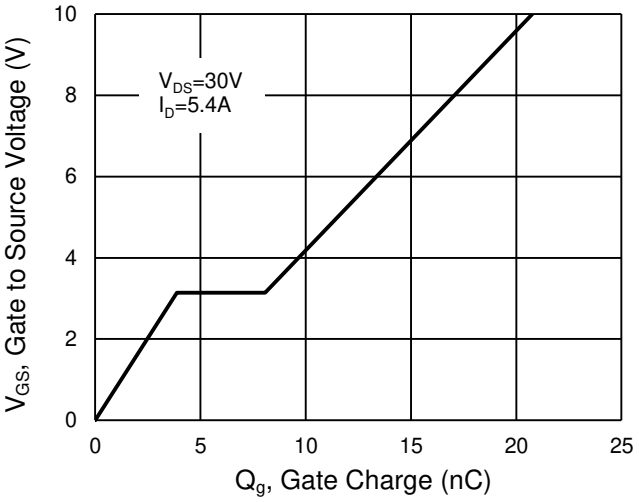
Transfer Characteristics



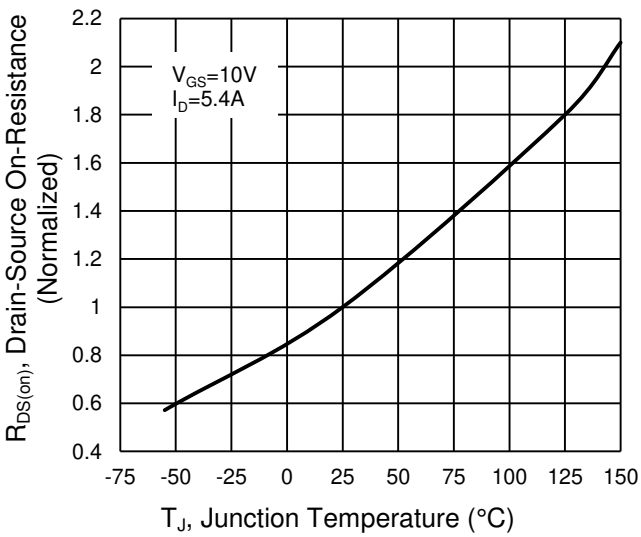
On-Resistance vs. Drain Current



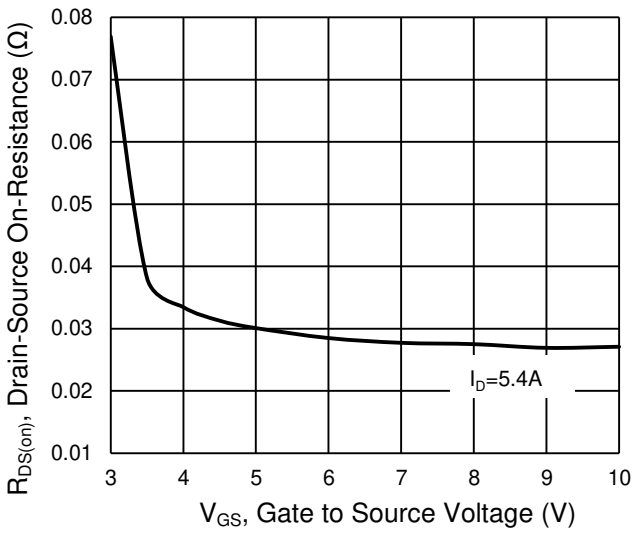
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



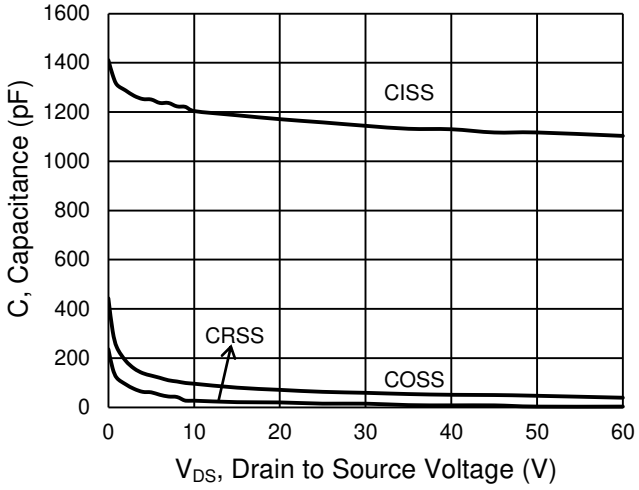
On-Resistance vs. Gate-Source Voltage



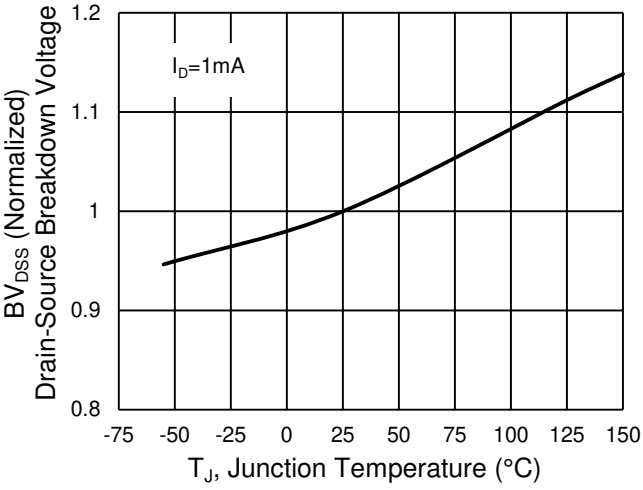
CHARACTERISTICS CURVES (N-Channel)

(T_A = 25°C unless otherwise noted)

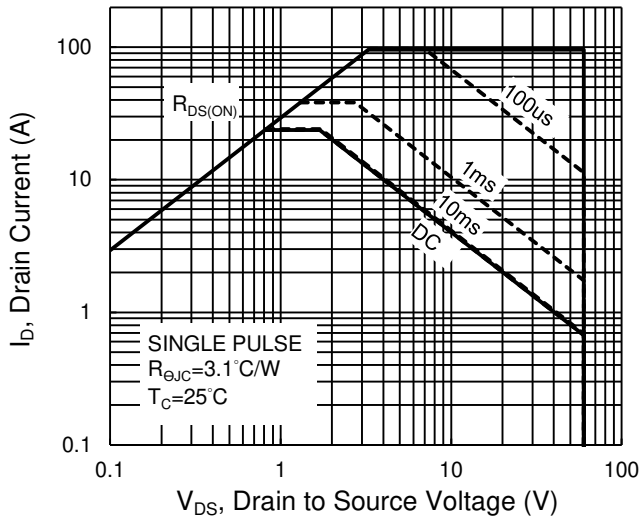
Capacitance vs. Drain-Source Voltage



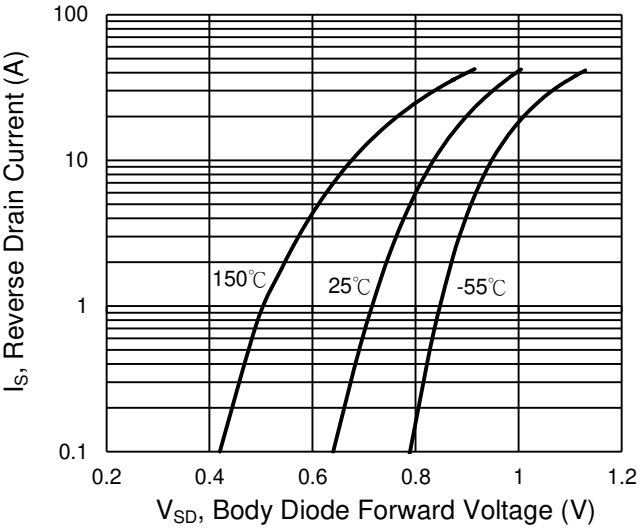
BV_{DSS} vs. Junction Temperature



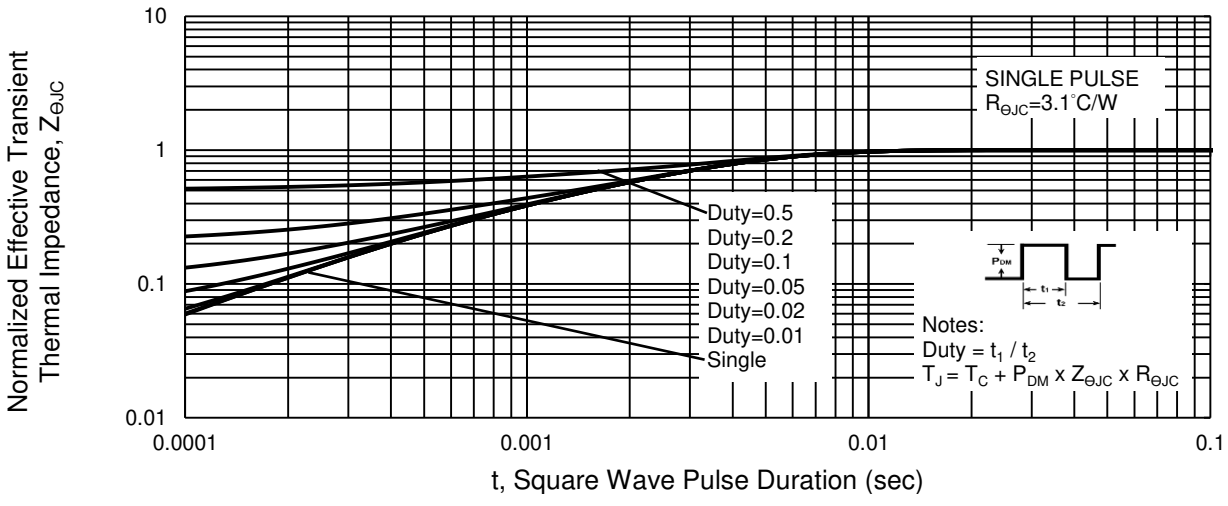
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage



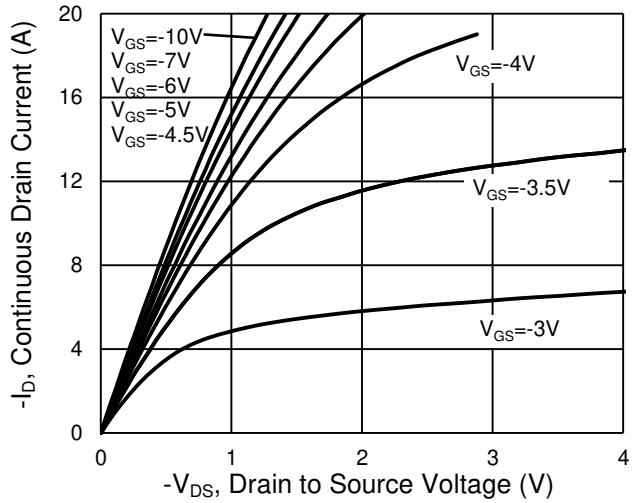
Normalized Thermal Transient Impedance, Junction-to-Case



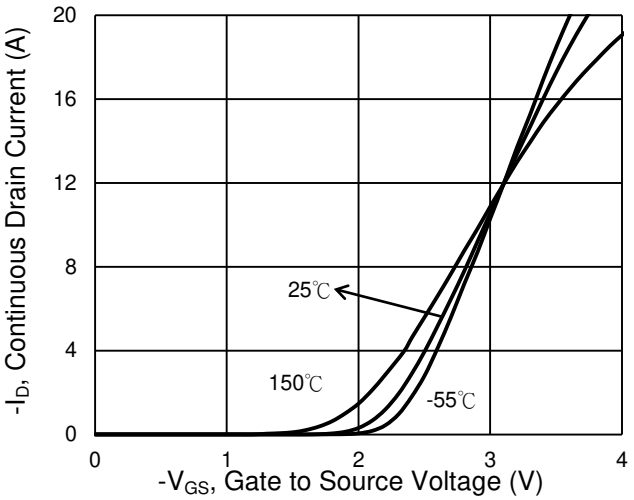
CHARACTERISTICS CURVES (P-Channel)

(T_A = 25°C unless otherwise noted)

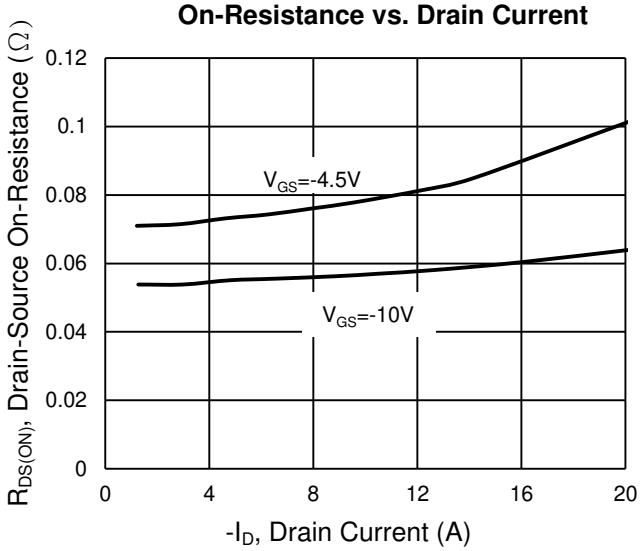
Output Characteristics



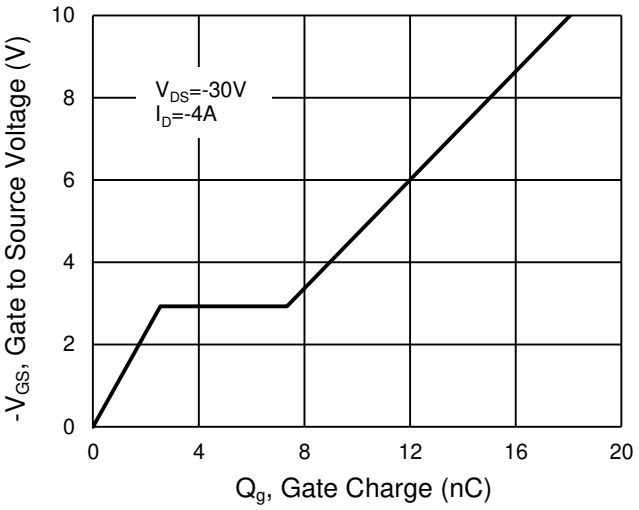
Transfer Characteristics



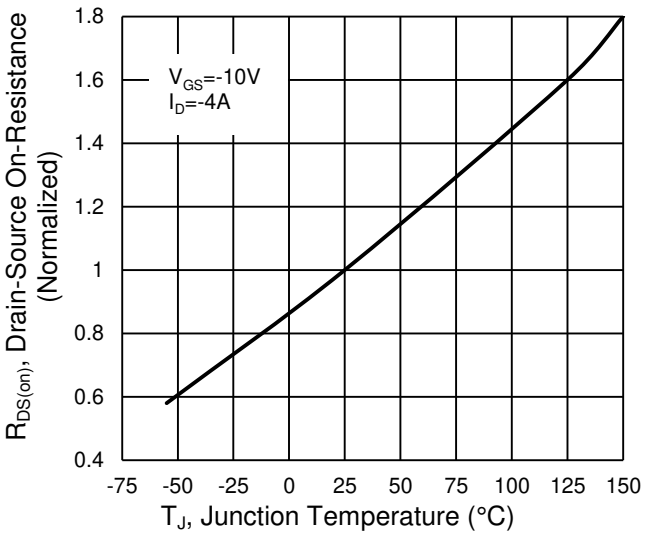
On-Resistance vs. Drain Current



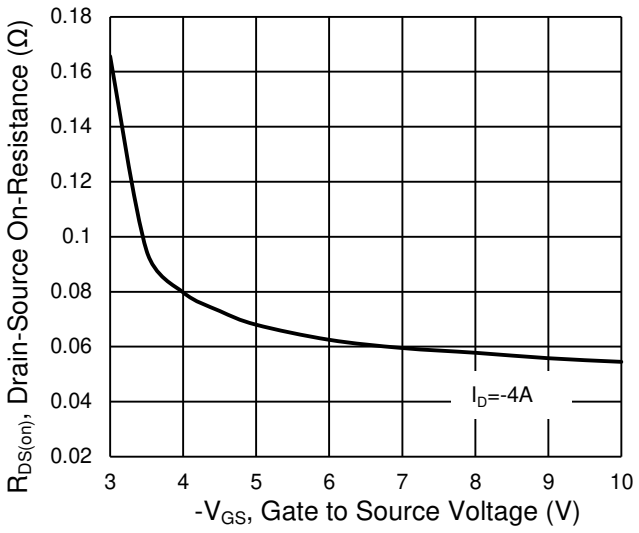
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



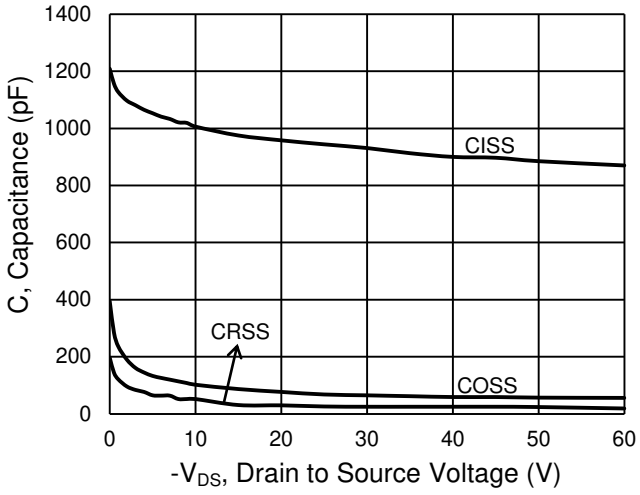
On-Resistance vs. Gate-Source Voltage



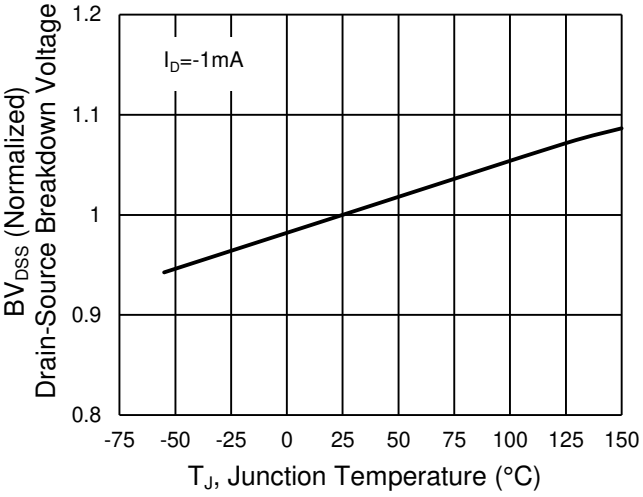
CHARACTERISTICS CURVES (P-Channel)

(T_A = 25°C unless otherwise noted)

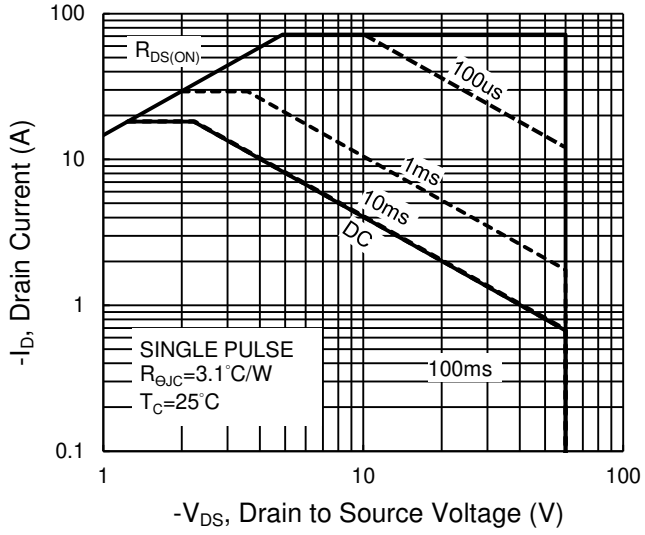
Capacitance vs. Drain-Source Voltage



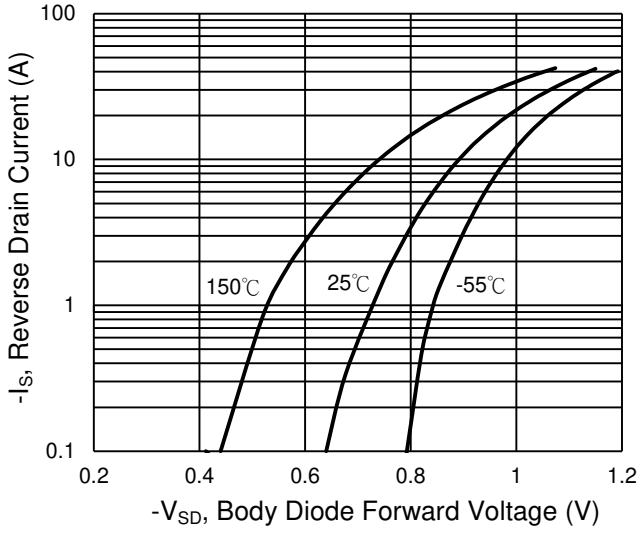
BV_{DSS} vs. Junction Temperature



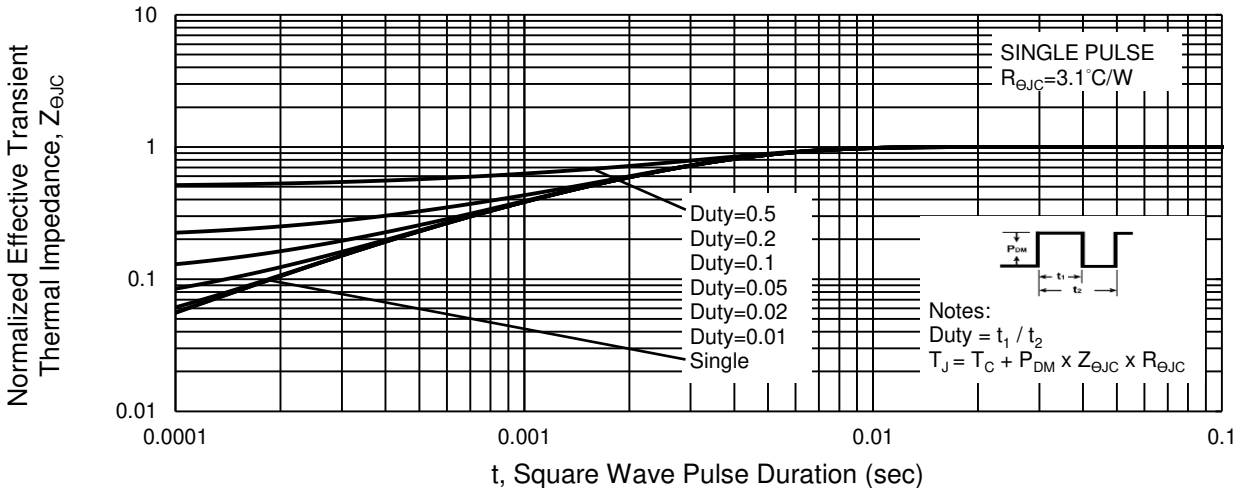
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

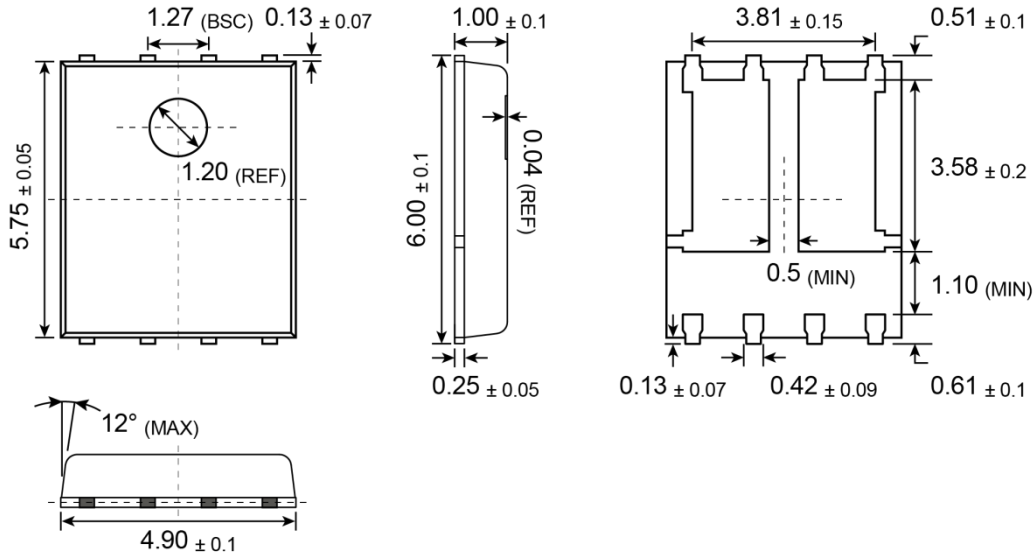


Normalized Thermal Transient Impedance, Junction-to-Case

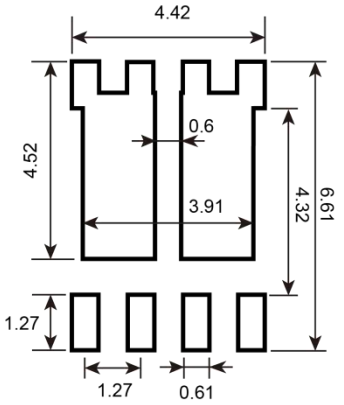


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

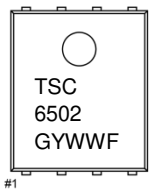
PDFN56 Dual



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



G = Halogen Free
Y = Year Code
WW = Week Code (01~52)
F = Factory Code

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