

N- and P-Channel 30V (D-S) Power MOSFET

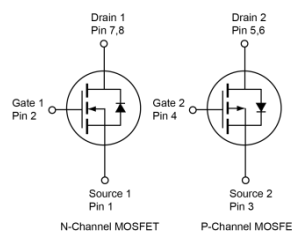
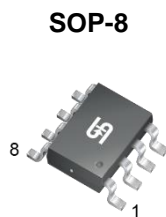
FEATURES

- 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	30	V
	P-ch	-30	
$R_{DS(on)}$ (max)	N-ch	$V_{GS} = 10V$	16
		$V_{GS} = 4.5V$	20
	P-ch	$V_{GS} = -10V$	24
		$V_{GS} = -4.5V$	37
Q_g	N-ch	7	nC
	P-ch	11	



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

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER	SYMBOL	N-ch	P-ch	UNIT
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 25	V
Continuous Drain Current ^(Note 1)	I_D	$T_C = 25^\circ\text{C}$	15	13
		$T_A = 25^\circ\text{C}$	8	7
Pulsed Drain Current	I_{DM}	60	52	A
Single Pulse Avalanche Current ^(Note 2)	I_{AS}	12	18	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	21.6	48.6	mJ
Total Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	6	6
		$T_C = 125^\circ\text{C}$	1.2	1.2
Total Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	1.6	1.6
		$T_A = 125^\circ\text{C}$	0.3	0.3
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150		$^\circ\text{C}$

THERMAL PERFORMANCE			
PARAMETER	SYMBOL	LIMIT	UNIT
Thermal Resistance – Junction to Case	$R_{\theta JC}$	21	$^\circ\text{C/W}$
Thermal Resistance – Junction to Ambient	$R_{\theta JA}$	78	

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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)								
PARAMETER	CONDITIONS	SYMBOL	TYPE	MIN	TYP	MAX	UNIT	
Static								
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	N-ch	30	--	--	V	
	$V_{GS} = 0V, I_D = -250\mu A$		P-ch	-30	--	--		
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu A$	$V_{GS(TH)}$	N-ch	1	1.4	2.5	V	
	$V_{GS} = V_{DS}, I_D = -250\mu A$		P-ch	-1	-1.7	-2.5		
Gate-Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	N-ch	--	--	± 100	nA	
	$V_{GS} = \pm 25V, V_{DS} = 0V$		P-ch	--	--	± 100	nA	
Drain-Source Leakage Current	$V_{GS} = 0V, V_{DS} = 30V$	I_{DSS}	N-ch	--	--	1	μA	
	$V_{GS} = 0V, V_{DS} = 30V$ $T_J = 125^\circ\text{C}$			--	--	100		
	$V_{GS} = 0V, V_{DS} = -30V$		P-ch	--	--	-1		
	$V_{GS} = 0V, V_{DS} = -30V$ $T_J = 125^\circ\text{C}$			--	--	-100		
Drain-Source On-State Resistance ^(Note 3)	$V_{GS} = 10V, I_D = 8A$	$R_{DS(on)}$	N-ch	--	10	16	m Ω	
	$V_{GS} = 4.5V, I_D = 8A$			--	13	20		
	$V_{GS} = -10V, I_D = -7A$		P-ch	--	18	24		
	$V_{GS} = -4.5V, I_D = -7A$			--	30	37		
Forward Transconductance ^(Note 3)	$V_{DS} = 5V, I_D = 8A$	g_{fs}	N-ch	--	26	--	S	
	$V_{DS} = -5V, I_D = -7A$		P-ch	--	16	--		
Dynamic ^(Note 4)								
Total Gate Charge	N-ch $V_{DS} = 15V, I_D = 8A$ P-ch $V_{DS} = -15V, I_D = -7A$	$Q_{g(VGS=10V)}$	N-ch	--	14	--	nC	
			P-ch	--	21.5	--		
Total Gate Charge		$Q_{g(VGS=4.5V)}$	N-ch	--	7	--		
			P-ch	--	11	--		
Gate-Source Charge		Q_{gs}	N-ch	--	1.7	--		
			P-ch	--	3.4	--		
Gate-Drain Charge		Q_{gd}	N-ch	--	3.7	--		
			P-ch	--	5.3	--		
Input Capacitance	N-ch $V_{GS} = 0V, V_{DS} = 15V$	C_{iss}	N-ch	--	646	--	pF	
			P-ch	--	1089	--		
Output Capacitance	f = 1.0MHz P-ch	C_{oss}	N-ch	--	108	--		
			P-ch	--	190	--		
Reverse Transfer Capacitance	$V_{GS} = 0V, V_{DS} = -15V$ f = 1.0MHz	C_{rss}	N-ch	--	70	--		
			P-ch	--	119	--		
Gate Resistance	f = 1.0MHz	R_g	N-ch	0.9	3	6		Ω
			P-ch	3.6	12	24		

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted)							
PARAMETER	CONDITIONS	SYMBOL	TYPE	MIN	TYP	MAX	UNIT
Switching (Note 4)							
Turn-On Delay Time	N-ch	$t_{d(on)}$	N-ch	--	5.4	--	ns
			P-ch	--	6.2	--	
Turn-On Rise Time	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 8\text{A}, R_G = 2\Omega$	t_r	N-ch	--	41.3	--	
			P-ch	--	40.4	--	
Turn-Off Delay Time	P-ch	$t_{d(off)}$	N-ch	--	18	--	
			P-ch	--	45.4	--	
Turn-Off Fall Time	$I_D = -7\text{A}, R_G = 2\Omega$	t_f	N-ch	--	5.6	--	
			P-ch	--	45.4	--	
Source-Drain Diode							
Forward Voltage (Note 3)	$V_{GS} = 0\text{V}, I_S = 8\text{A}$	V_{SD}	N-ch	--	--	1	V
	$V_{GS} = 0\text{V}, I_S = -7\text{A}$		P-ch	--	--	-1	
Reverse Recovery Time	N-ch $I_S = 8\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	t_{rr}	N-ch	--	14	--	ns
			P-ch	--	32	--	
Reverse Recovery Charge	P-ch $I_S = -7\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	Q_{rr}	N-ch	--	4	--	nC
			P-ch	--	10	--	

Notes:

- Silicon limited current only.
- N-ch : $L = 0.3\text{mH}, V_{GS} = 10\text{V}, V_{DD} = 25\text{V}, R_G = 25\Omega, I_{AS} = 12\text{A}$, Starting $T_J = 25^\circ\text{C}$
 P-ch : $L = 0.3\text{mH}, V_{GS} = 10\text{V}, V_{DD} = 25\text{V}, R_G = 25\Omega, I_{AS} = 18\text{A}$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Switching time is essentially independent of operating temperature.

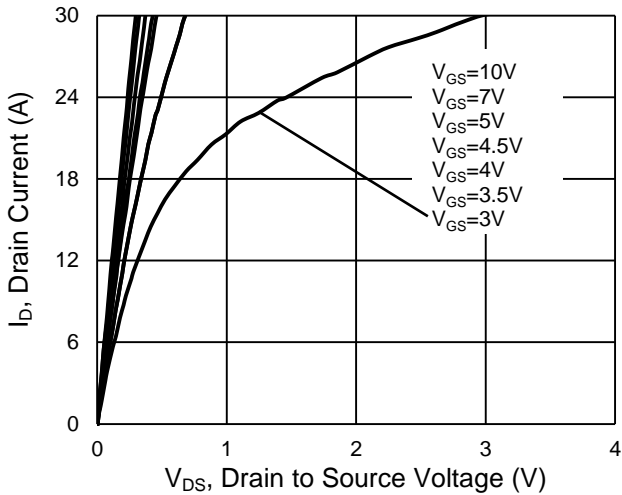
ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM8568CS RLG	SOP-8	2,500pcs / 13" Reel

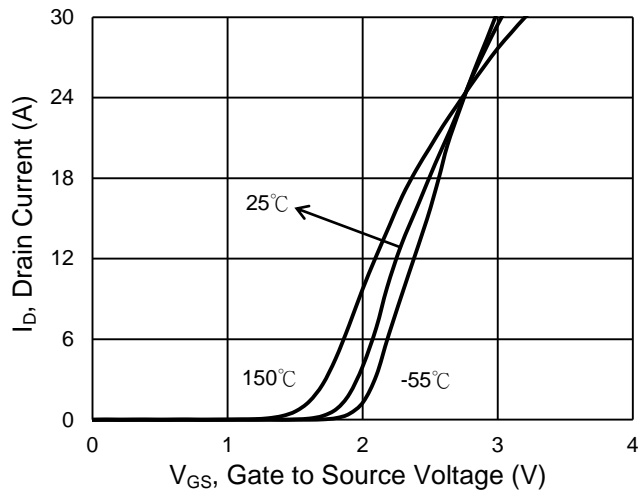
CHARACTERISTICS CURVES (N-Channel)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

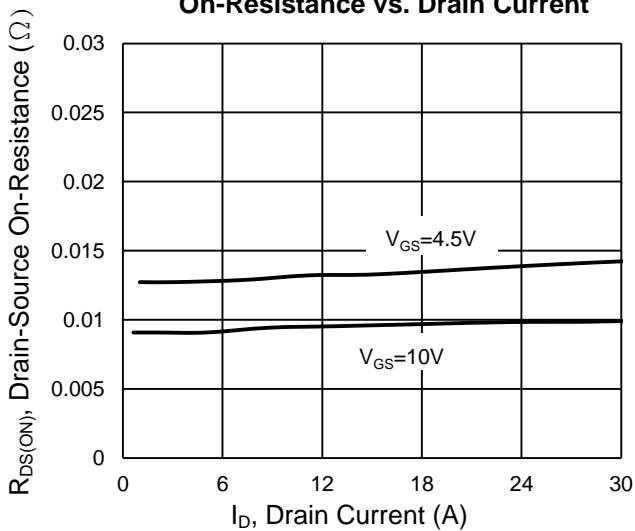
Output Characteristics



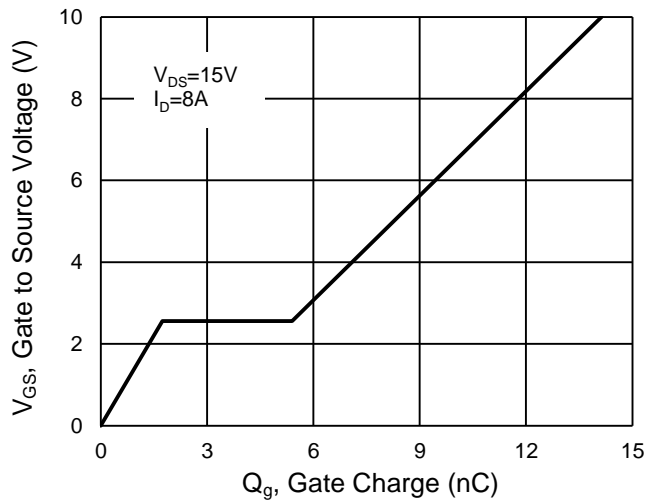
Transfer Characteristics



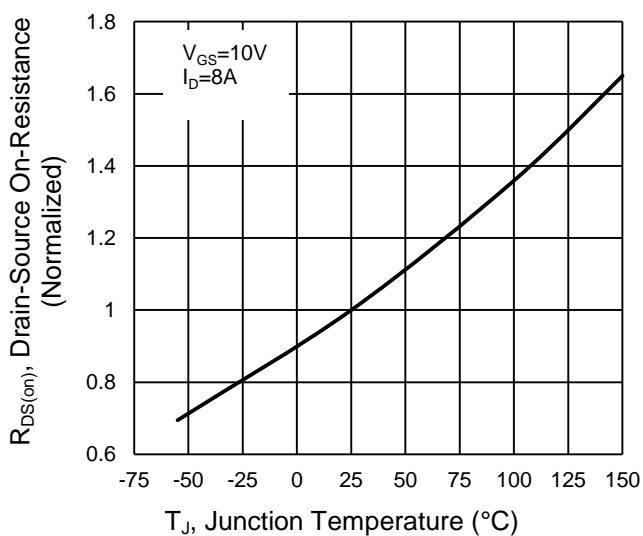
On-Resistance vs. Drain Current



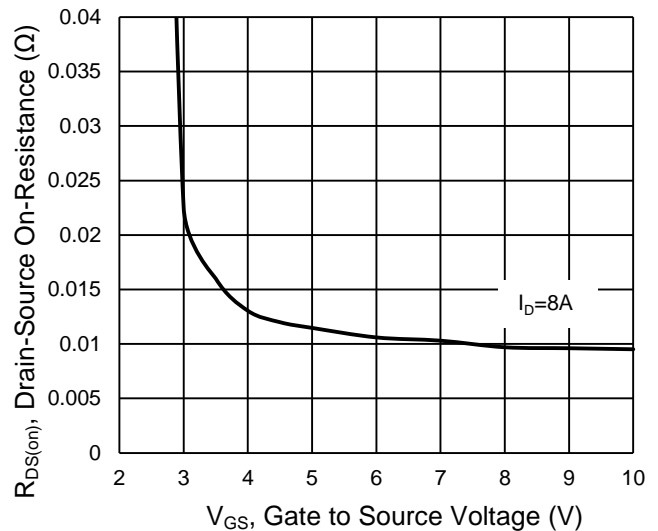
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

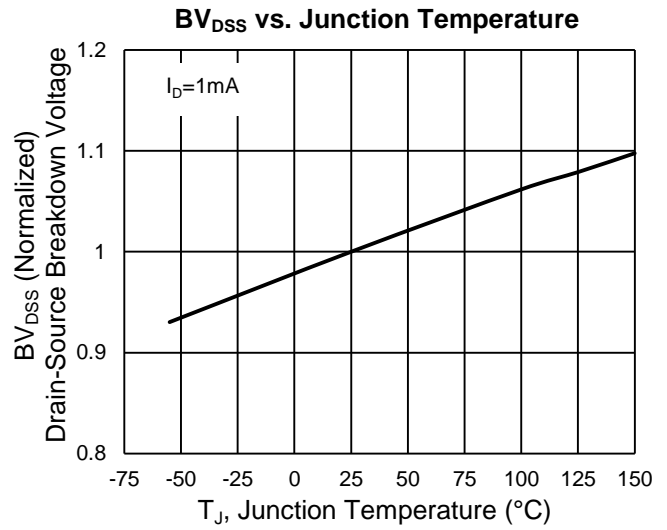
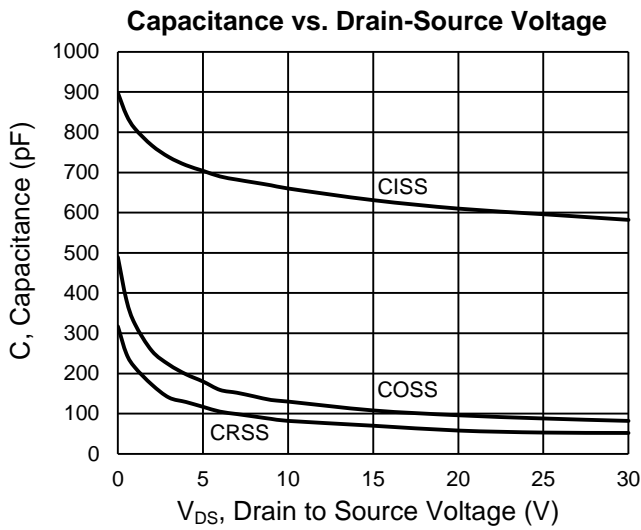


On-Resistance vs. Gate-Source Voltage

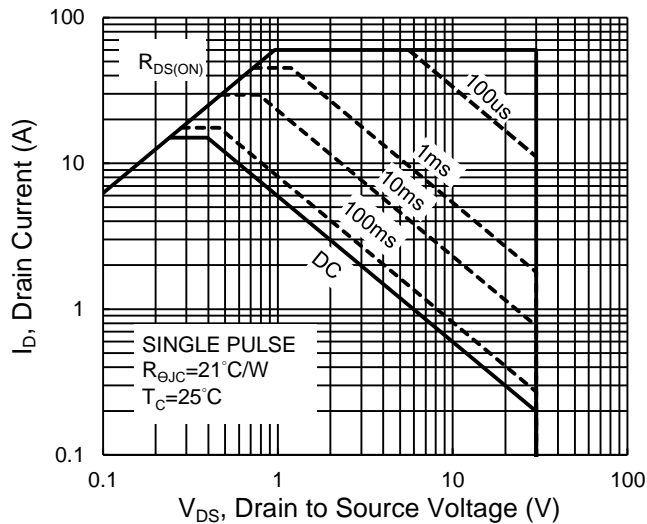


CHARACTERISTICS CURVES (N-Channel)

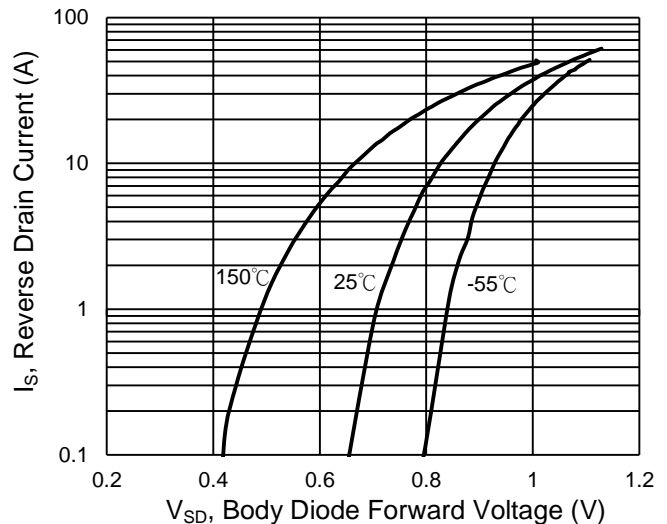
($T_A = 25^\circ\text{C}$ unless otherwise noted)



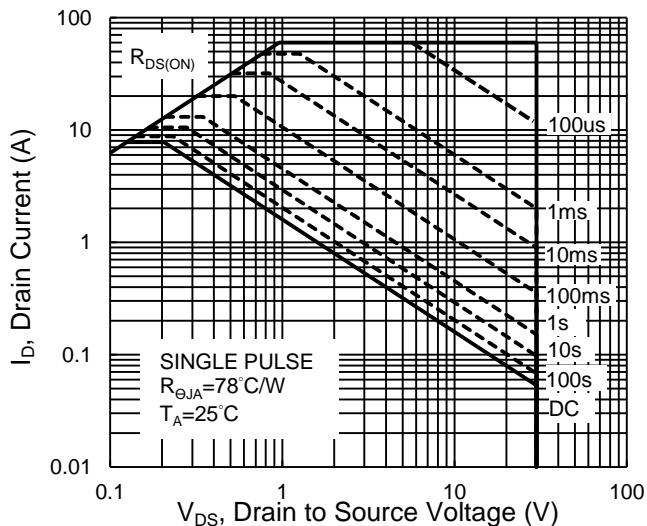
Maximum Safe Operating Area, Junction-to-Case



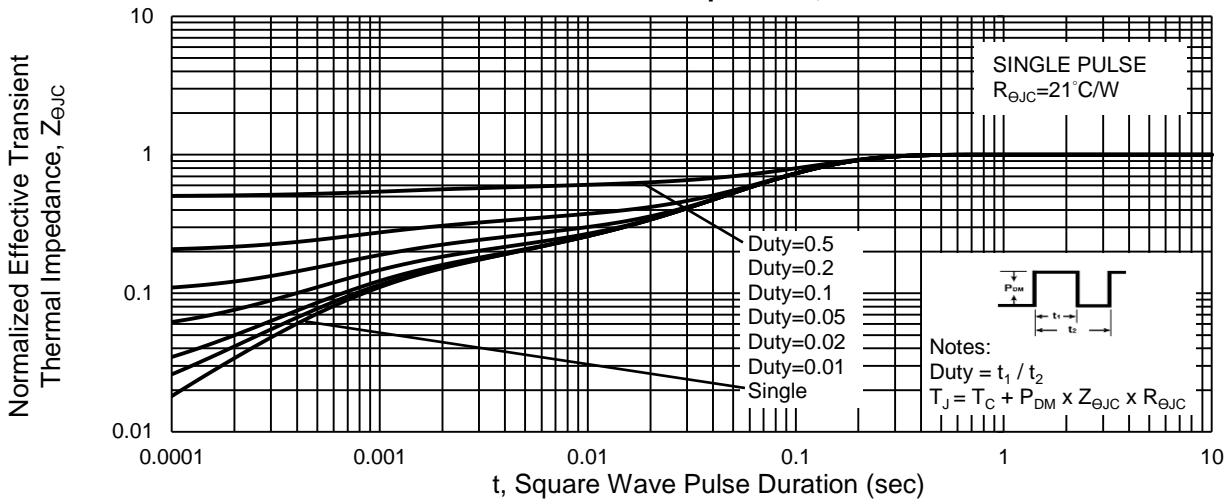
Source-Drain Diode Forward Current vs. Voltage



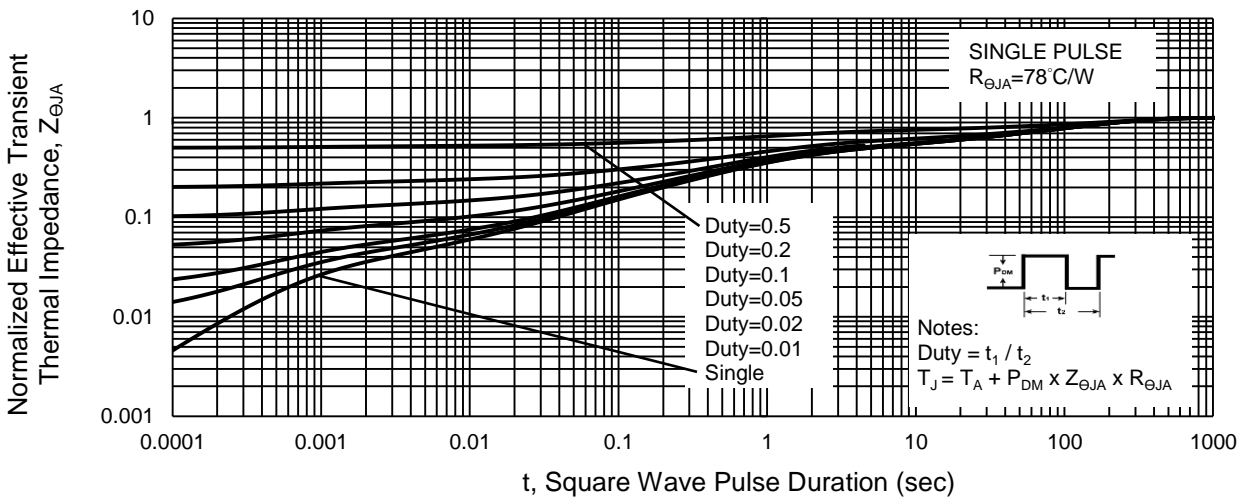
Maximum Safe Operating Area, Junction-to-Ambient



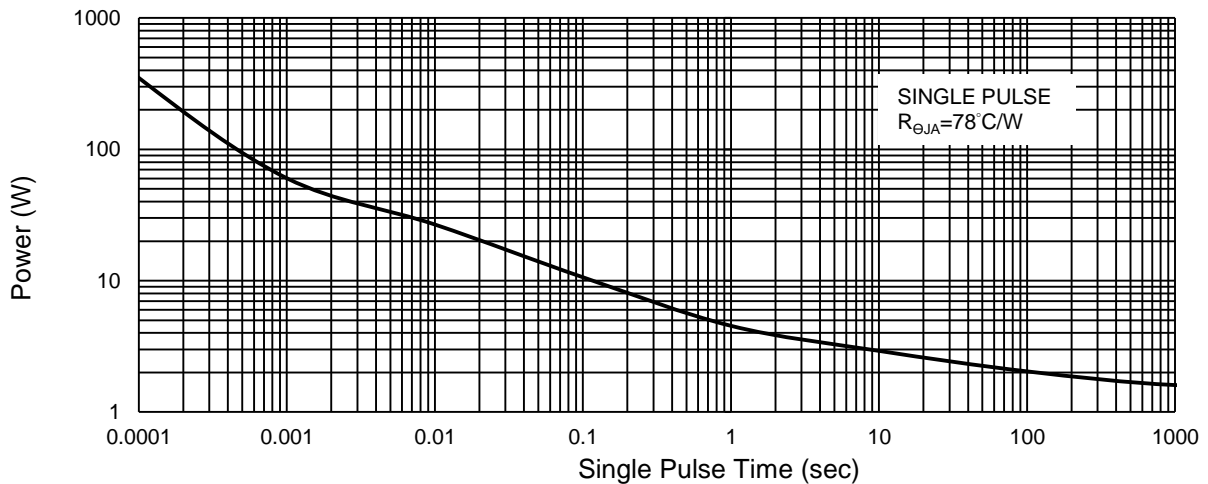
Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient



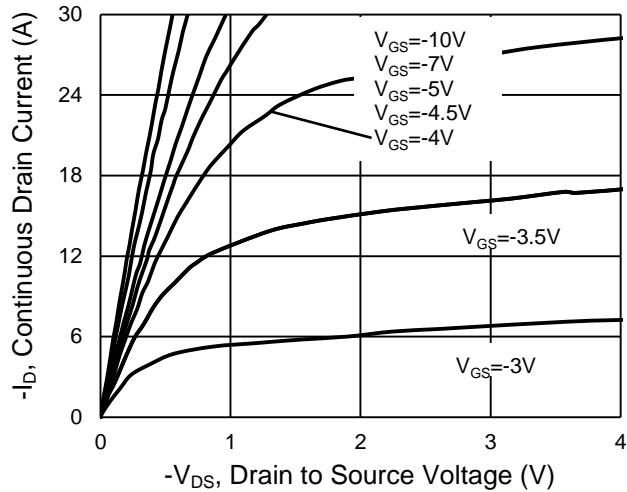
Single Pulse Maximum Power Dissipation, Junction-to-Ambient



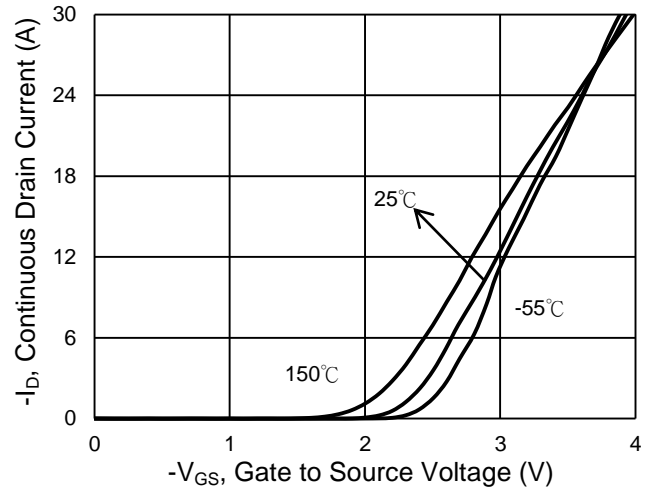
CHARACTERISTICS CURVES (P-Channel)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

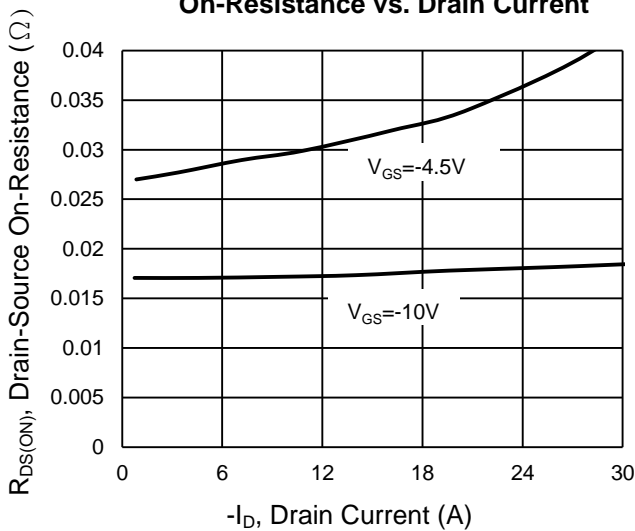
Output Characteristics



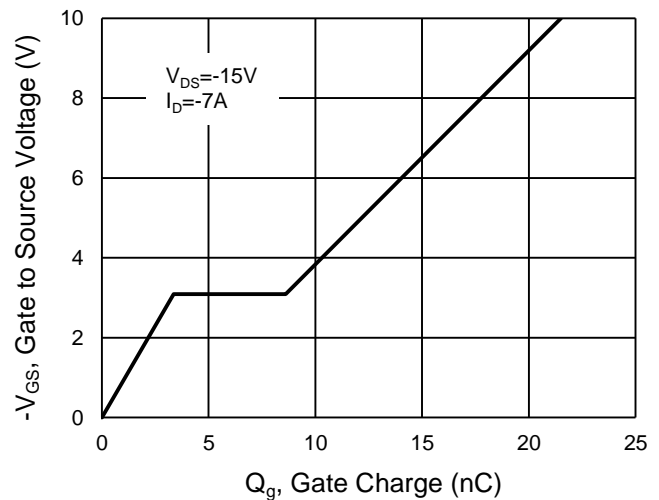
Transfer Characteristics



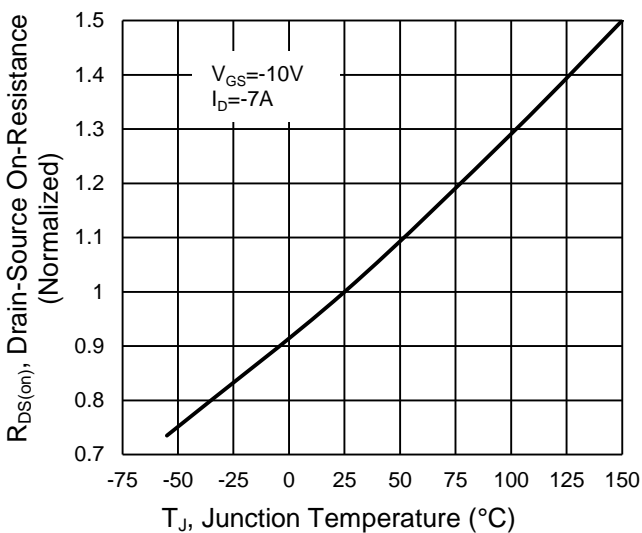
On-Resistance vs. Drain Current



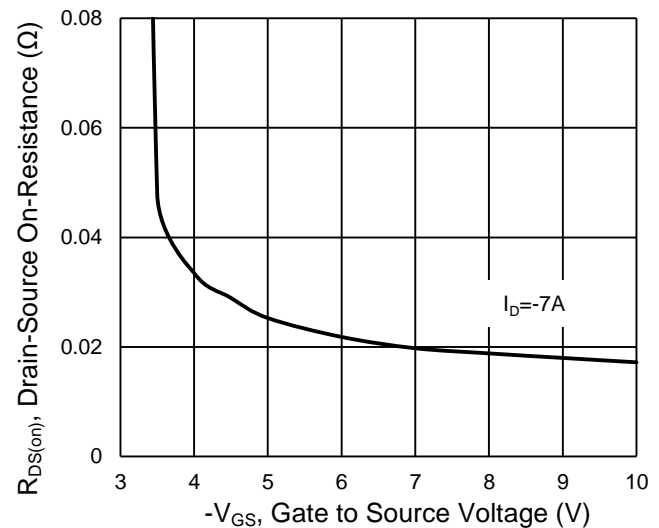
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



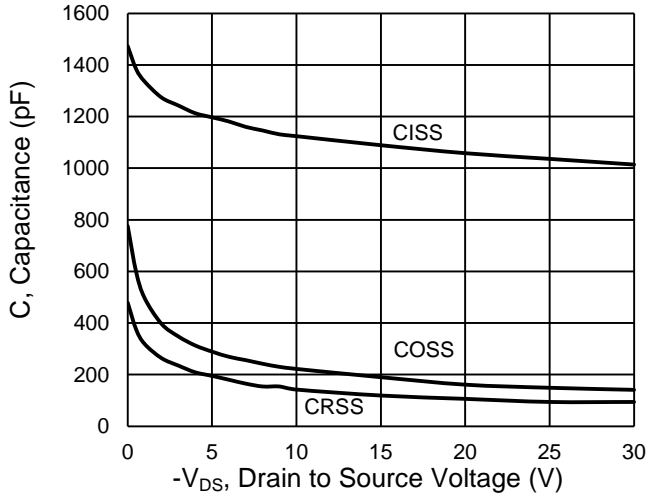
On-Resistance vs. Gate-Source Voltage



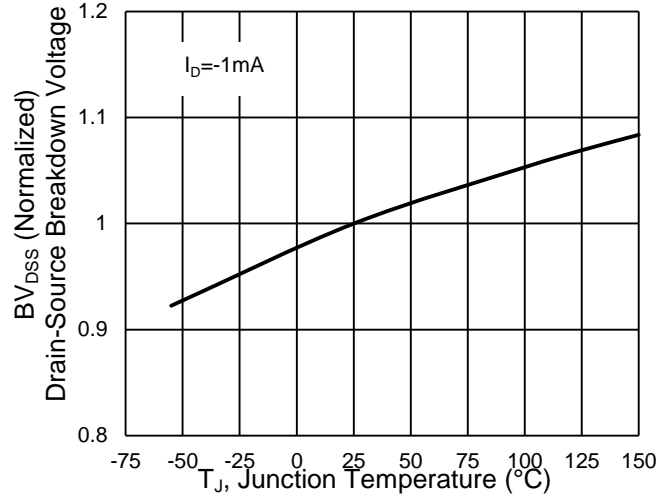
CHARACTERISTICS CURVES (P-Channel)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

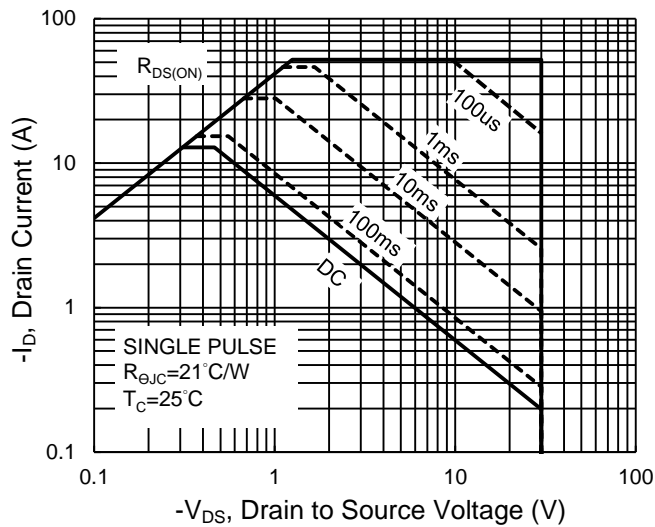
Capacitance vs. Drain-Source Voltage



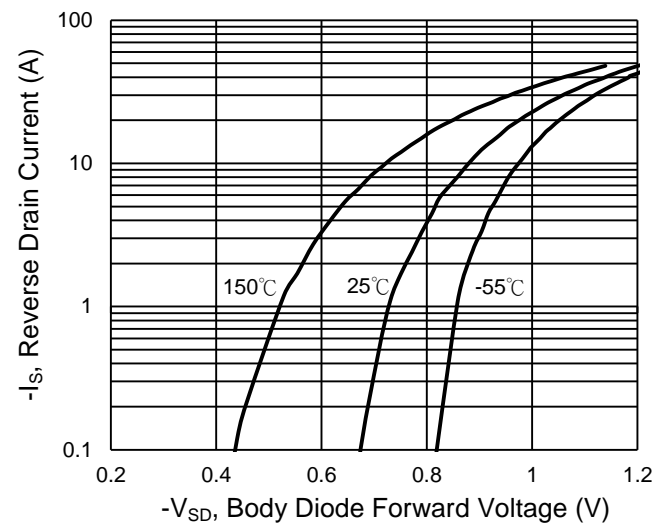
BV_{DSS} vs. Junction Temperature



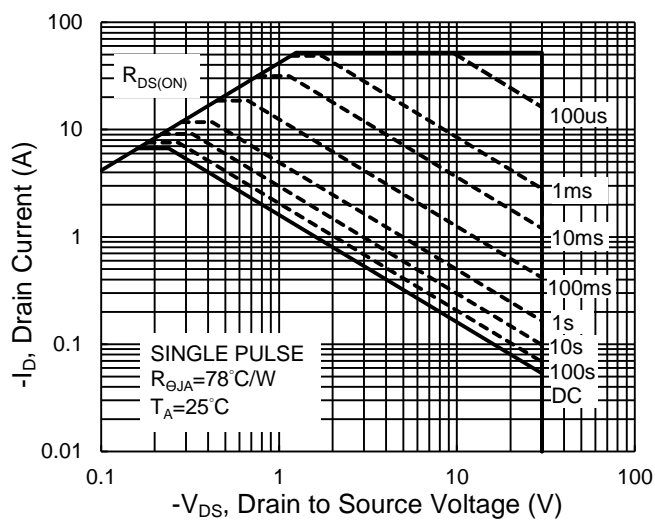
Maximum Safe Operating Area, Junction-to-Case



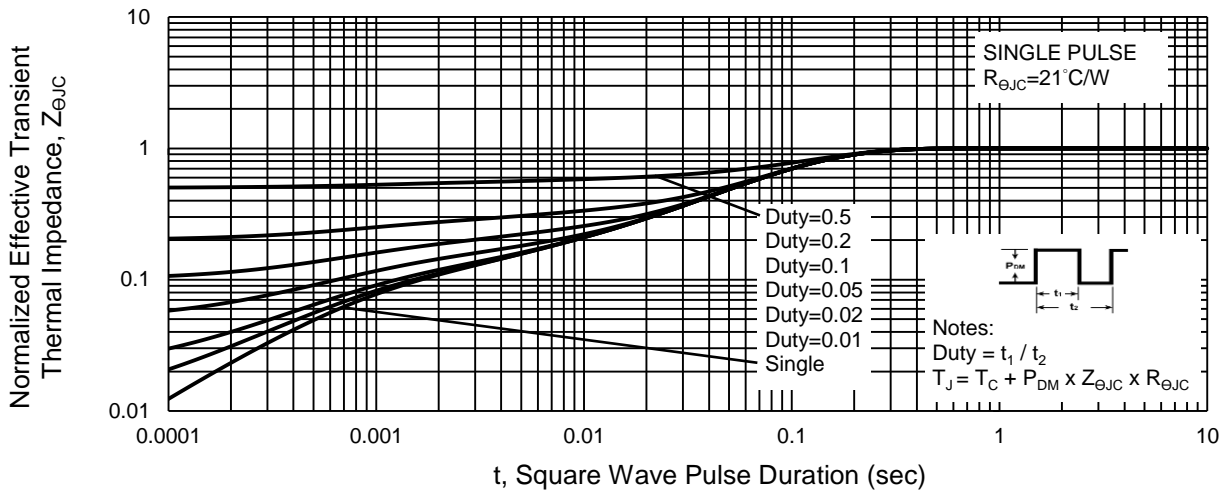
Source-Drain Diode Forward Current vs. Voltage



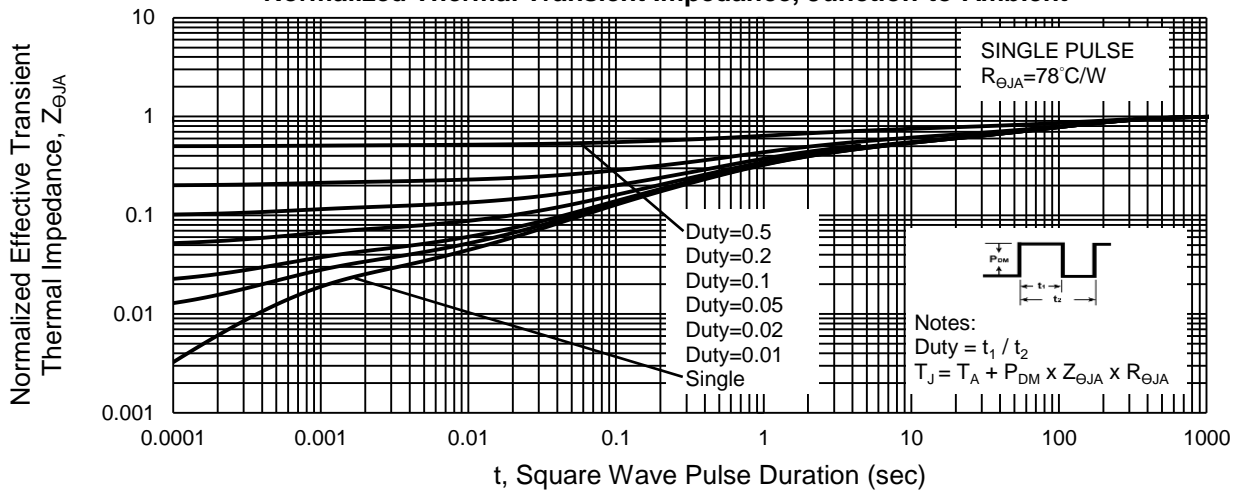
Maximum Safe Operating Area, Junction-to-Ambient



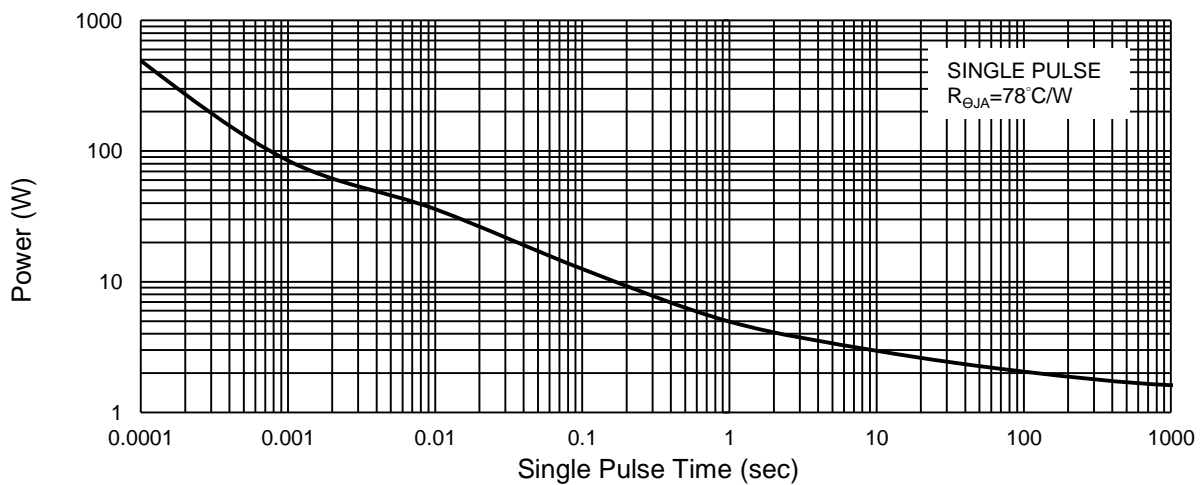
Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

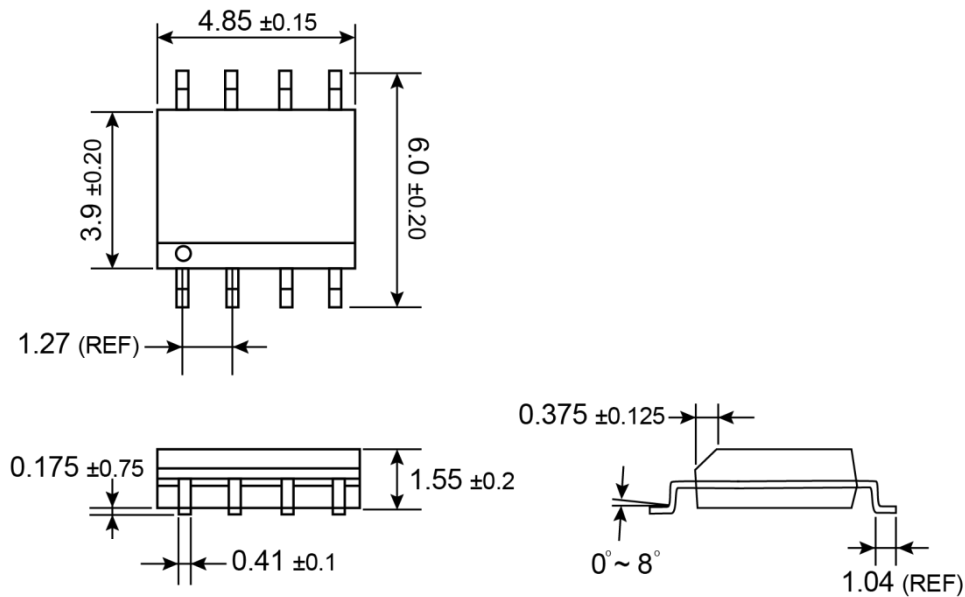


Single Pulse Maximum Power Dissipation, Junction-to-Ambient

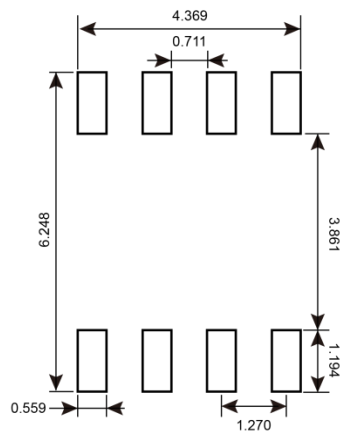


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

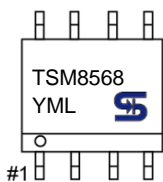
SOP-8



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- Y** = Year Code
- M** = Month Code
- 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)

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