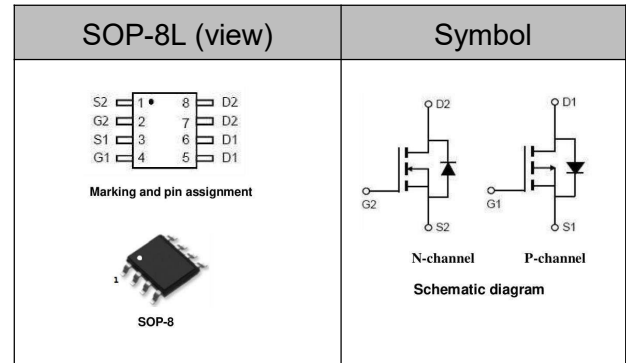


Features

- ◆ NMOS 40V, 7A
 $R_{DS(ON)} = 28m\Omega(Typ.)@V_{GS} = 10V$
 $R_{DS(ON)} = 36m\Omega(Typ.)@V_{GS} = 4.5V$
- ◆ PMOS -40V, -6A
 $R_{DS(ON)} = 58m\Omega(Typ.)@V_{GS} = -10V$
 $R_{DS(ON)} = 70m\Omega(Typ.)@V_{GS} = -4.5V$
- ◆ Advanced Trench Technology
- ◆ Excellent $R_{DS(ON)}$ and Low Gate Charge



Application

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management

Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Max.N-MOS	Max.P-MOS	Unit
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	
I_D	Drain Current-Continuous, $T_C = 25^\circ C$	7	-6	A
I_{DM}	Drain Current-Pulsed ^a	28	-24	
E_{AS}	Avalanche Energy, Single pulse ^b	19	20	mJ
P_D	Total Power Dissipation @ $T_C = 25^\circ C$	3	3	W
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to 150		$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.N-MOS	Max.P-MOS	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ^c	42	45	$^\circ C/W$

Electrical Characteristics $T_J = 25^\circ C$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	N	40	-	-	V
		$V_{GS} = 0V, I_D = -250\mu A$	P	-40	-	-	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 40V, V_{GS} = 0V$	N	-	-	1	μA
		$V_{DS} = -40V, V_{GS} = 0V$	P	-	-	1	
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	N	-	-	± 100	nA
		$V_{DS} = 0V, V_{GS} = \pm 20V$	P	-	-	± 100	

■ On Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	N	1.0	2.0	2.5	V
		$V_{DS} = V_{GS}, I_D = -250\mu A$	P	1.0	1.6	2.5	
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 5A$	N	-	28	38	mΩ
		$V_{GS} = 10V, I_D = -5A$	P	-	58	75	
		$V_{GS} = 4.5V, I_D = 3A$	N	-	36	50	
		$V_{GS} = 4.5V, I_D = -3A$	P	-	70	100	

■ Dynamic Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
R _g	Gate Resistance	V _{GS} = 0V, V _{DS} = 0V f = 1.0MHz	N	-	2.1	-	Ω
			P	-	13.5	-	
C _{iss}	Input Capacitance	N-MOS V _{DS} = 20V, V _{GS} = 0V, f = 1.0MHz P-MOS V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz	N	-	516	-	pF
C _{oss}	Output Capacitance		P	-	500	-	
			N	-	50	-	
C _{rss}	Reverse Transfer Capacitance		P	-	53	-	
			N	-	40	-	
			P	-	28	-	

■ On Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	N-MOS $V_{DD} = 30V, I_D = 2A,$ $R_G = 1\Omega, V_{GS} = 10V$	N	-	4	-	ns
			P	-	9	-	
t_r	Turn-On Rise Time		N	-	21	-	
			P	-	8	-	
$t_{d(off)}$	Turn-Off Delay Time	P-MOS $V_{DD} = -20V, I_D = -3A,$ $R_G = -1\Omega, V_{GS} = -10V$	N	-	12	-	
			P	-	28	-	
t_f	Turn-Off Fall Time		N	-	20	-	
			P	-	10	-	
Q_g	Total Gate Charge	N-MOS $V_{DS} = 20V, I_D = 3A,$ $V_{GS} = 10V$	N	-	9.8	-	nC
			P	-	14	-	
Q_{gs}	Gate-Source Charge		N	-	1.9	-	
			P	-	2.9	-	
Q_{gd}	Gate-Drain Charge	P-MOS $V_{DS} = -20V, I_D = -3A,$ $V_{GS} = -10V$	N	-	2.1	-	
			P	-	3.8	-	

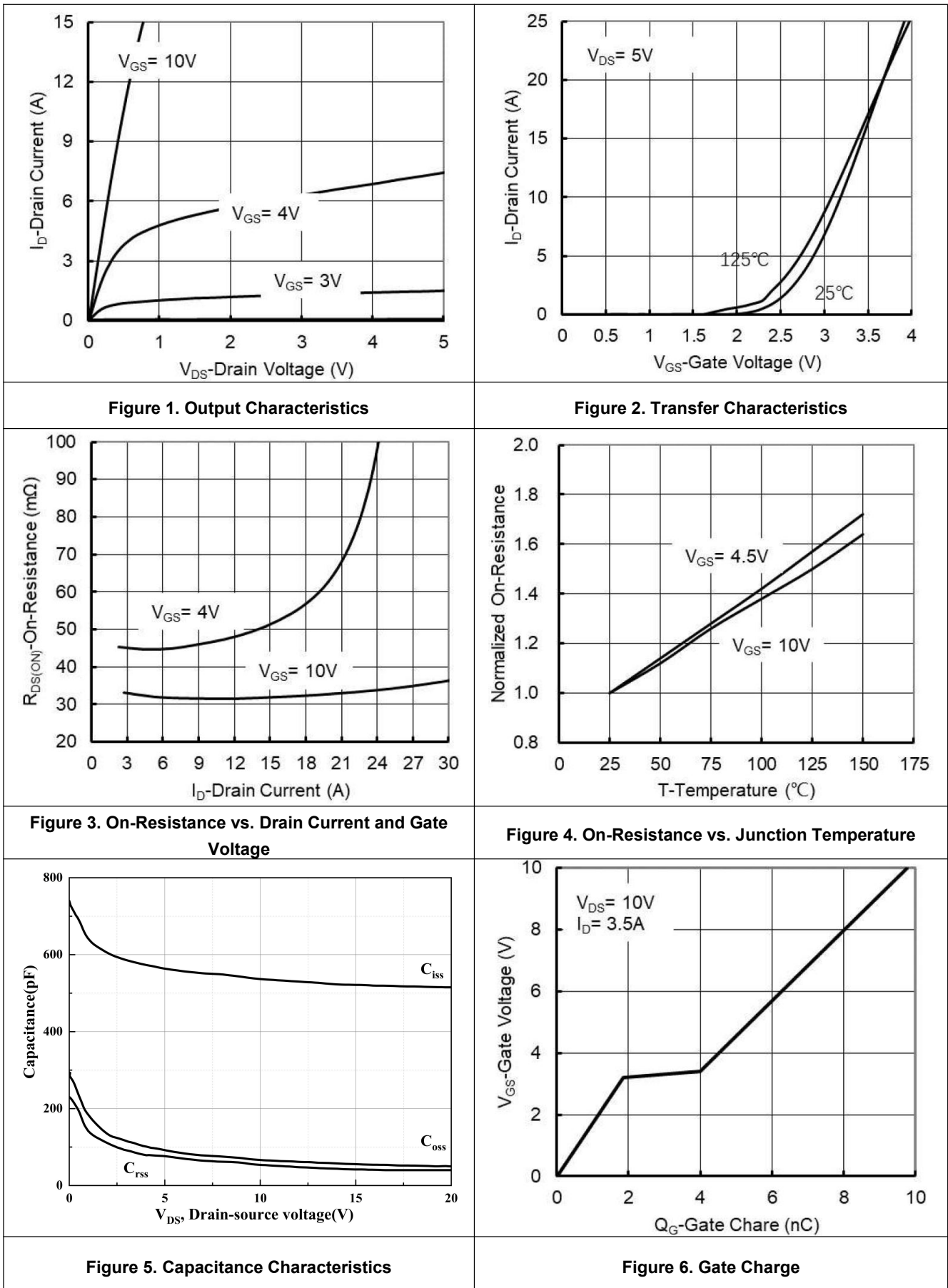
■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G = V_D = 0V$, Force Current	N	-	-	7	A
			P	-	-	-6	
I_{SM}	Pulse Source Current		N	-	-	28	
			P	-	-	-24	
V_{SD}	Drain-Source Diode Forward Voltage ^d	$V_{GS} = 0V, I_{SD} = 5A$	N	-	-	1.2	V
		$V_{GS} = 0V, I_{SD} = -5A$	P	-	-	-1.2	

Notes:

- a: Max. current is limited by junction temperature.
- b: The EAS data shows Max. Rating. The test condition:
N-MOS: $V_{DD} = 25V, V_{GS} = 10V, L = 0.5mH, I_{AS} = 9.6A$.
P-MOS: $V_{DD} = -25V, V_{GS} = -10V, L = 0.5mH, I_{AS} = -9.9A$.
- c: Surface Mounted on 1in2 FR-4 board with 1oz.
- d: Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).
- e: Guaranteed by design, not subject to production testing.

■ N-channel Characteristic Curve



■ N-channel Characteristic Curve

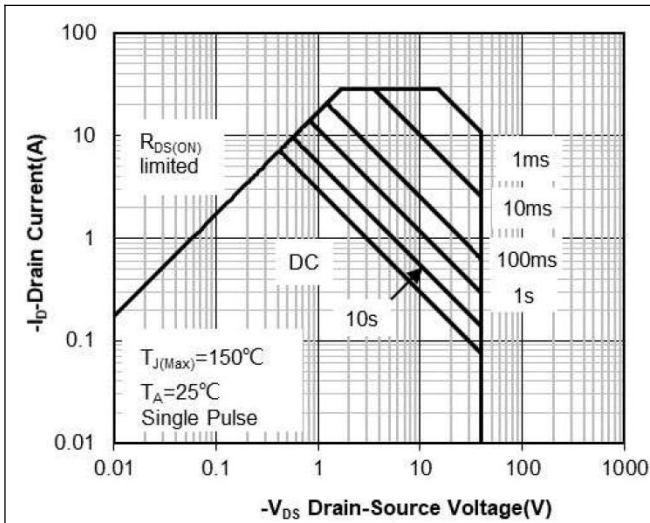


Figure 7. Safe Operation Area

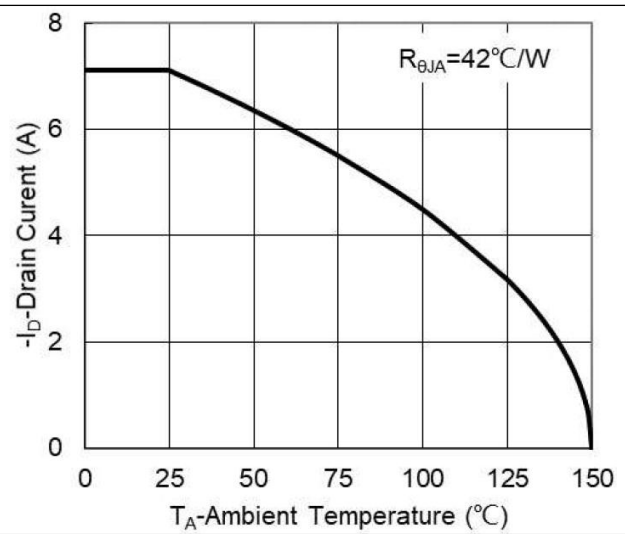


Figure 8. Maximum Continuous Drain Current vs Ambient Temperature

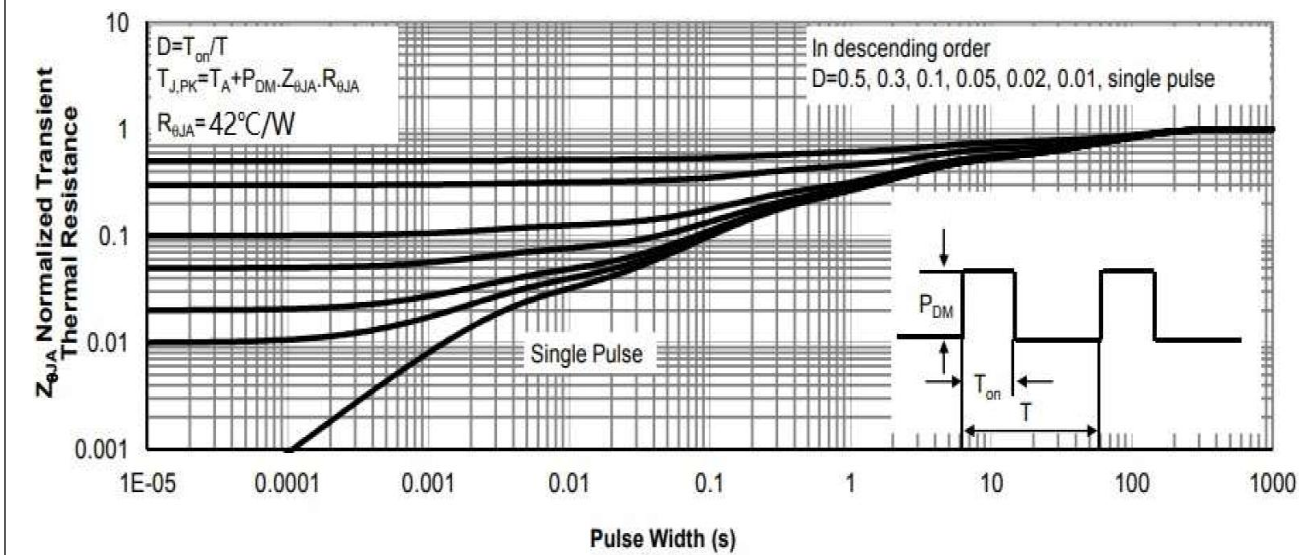


Figure 9. Normalized Maximum Transient Thermal Impedance

■ P-channel Characteristic Curve

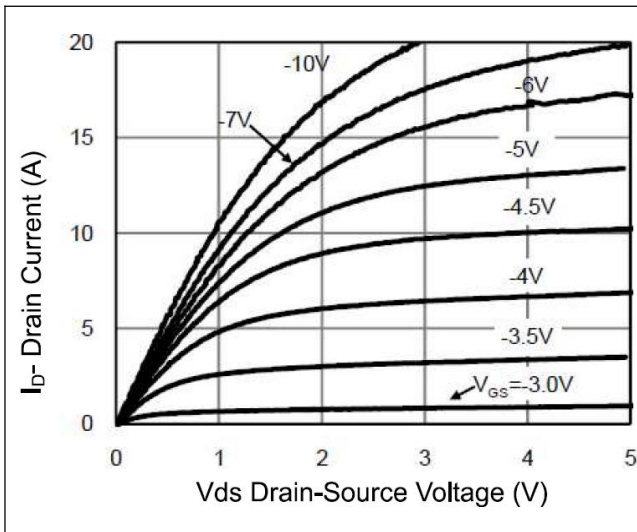


Figure 1. Output Characteristics

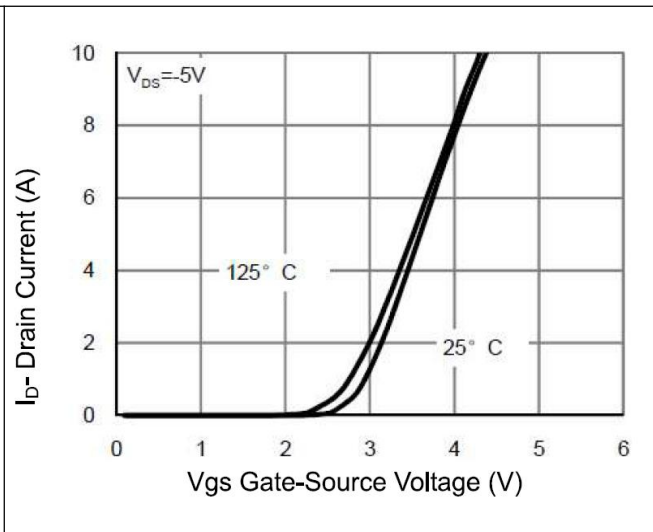


Figure 2. Transfer Characteristics

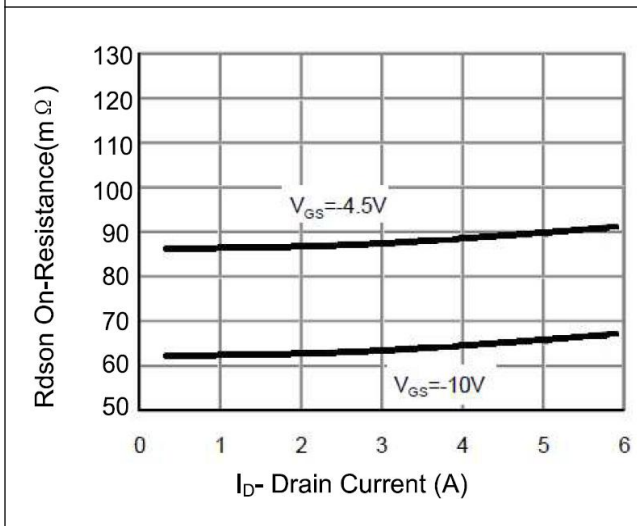


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

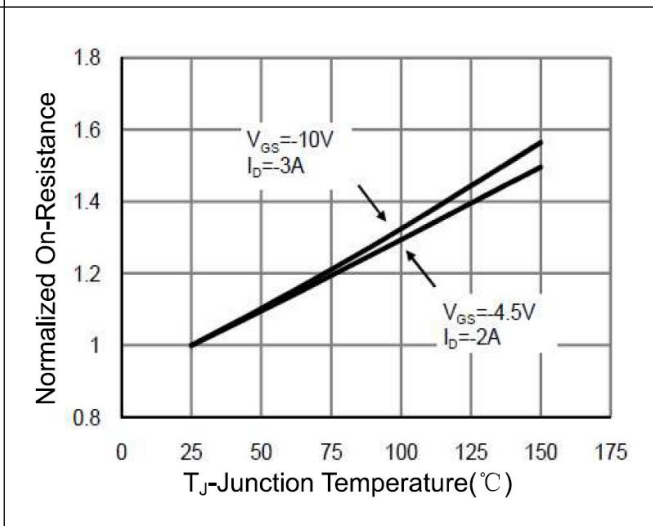


Figure 4. On-Resistance vs. Junction Temperature

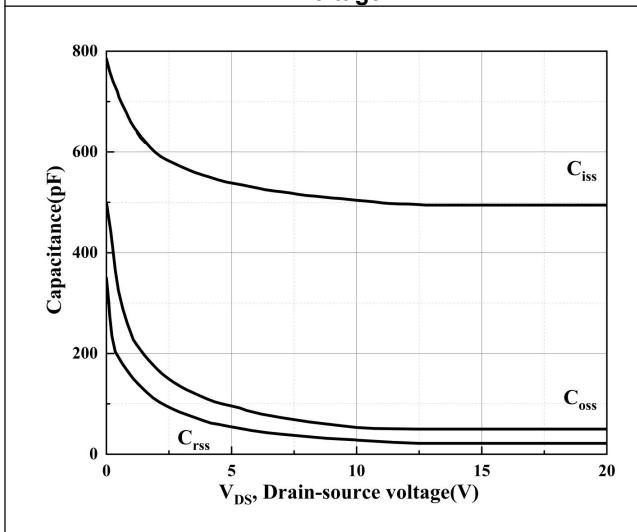


Figure 5. Capacitance Characteristics

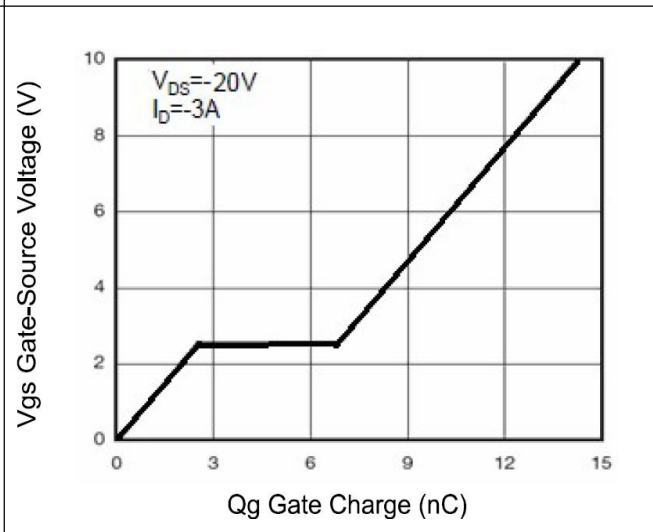


Figure 6. Gate Charge

■ **P-channel Characteristic Curve**

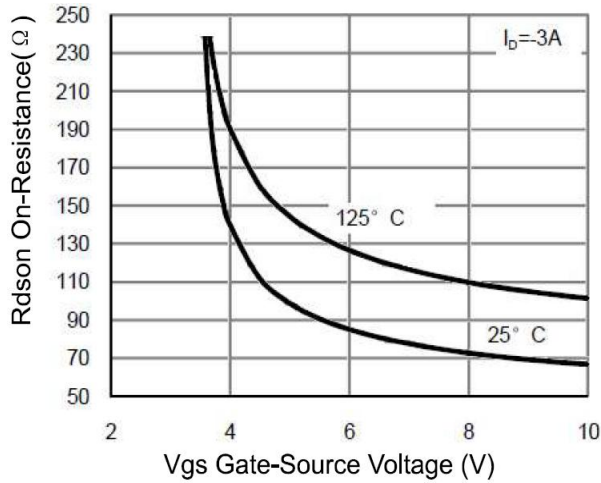


Figure 7. Rdson vs Vgs

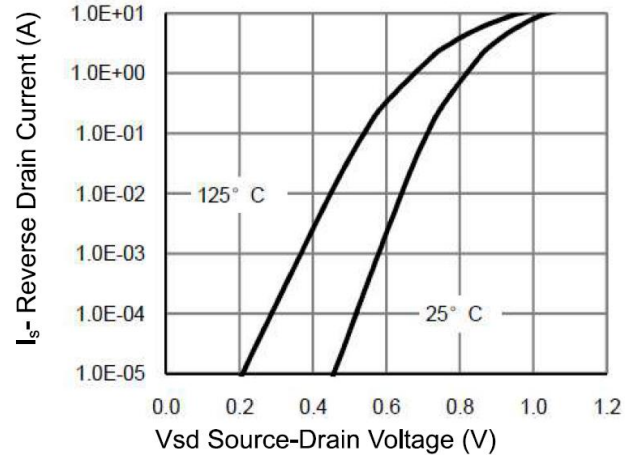


Figure 8. Source-Drain Diode Forward

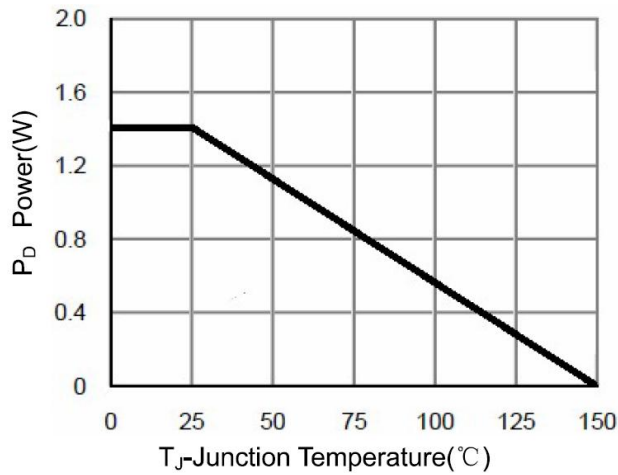


Figure 9. Power Dissipation

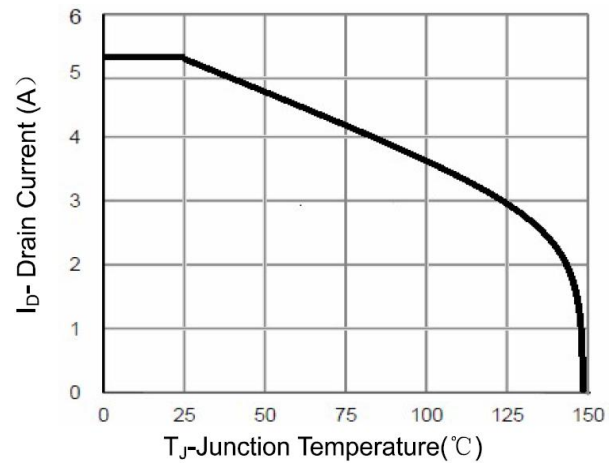


Figure 10. Drain Current

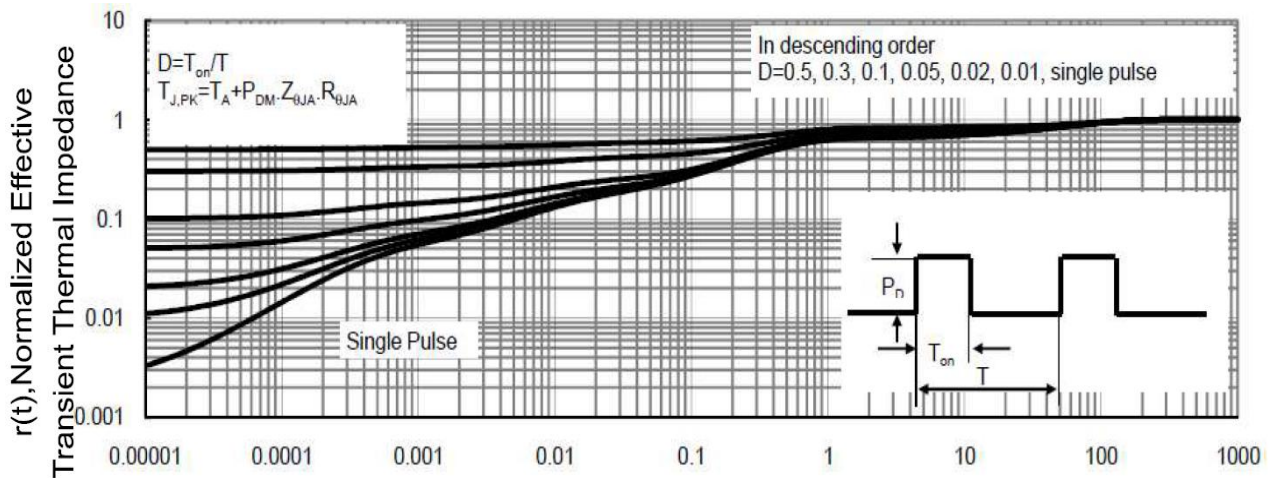
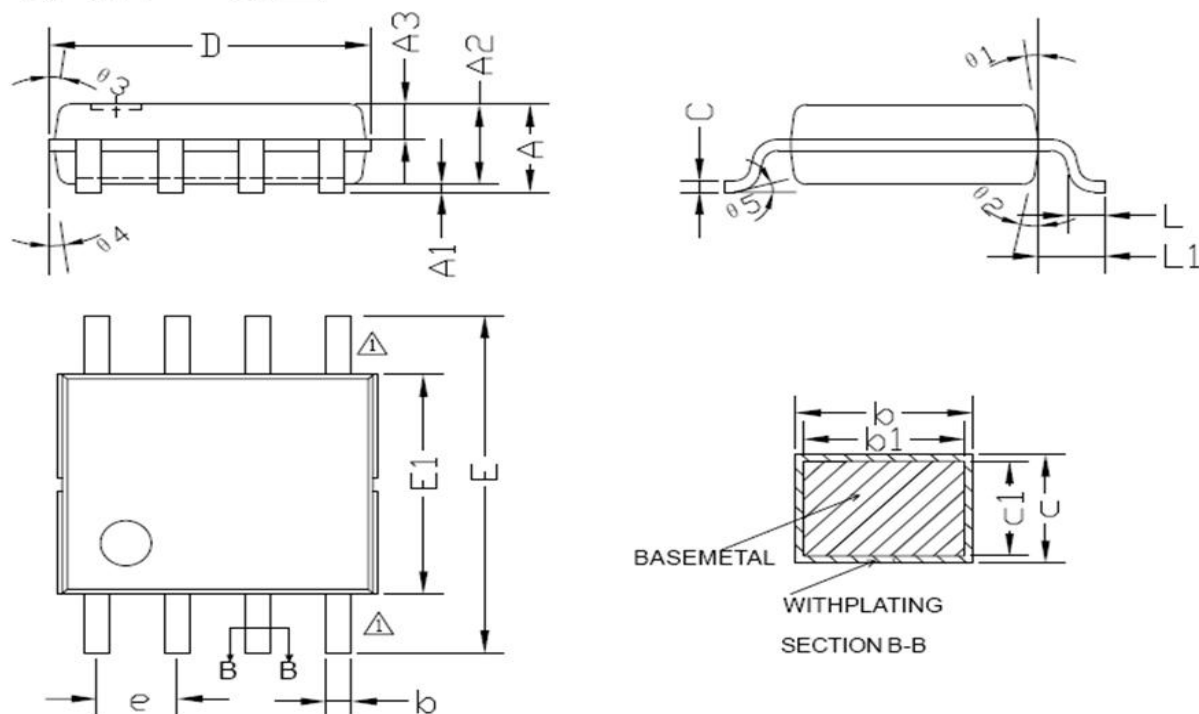


Figure 11. Normalized Maximum Transient Thermal Impedance

■ Package Information

SOP-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.65
A1	0.10	--	0.25
A2	1.40	1.42	1.50
A3	0.57	0.62	0.67
b	0.33	--	0.47
b1	0.32	0.41	0.44
c	0.20	--	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.85	3.90	3.95
e	1.27(BSC)		
L	0.50	0.60	0.70
L1	1.05(BSC)		
θ1	6°	~	12°
θ2	6°	~	12°
θ3	5°	~	10°
θ4	5°	~	10°
θ5	0°	~	6°