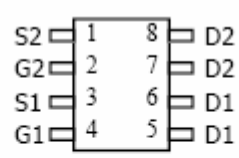
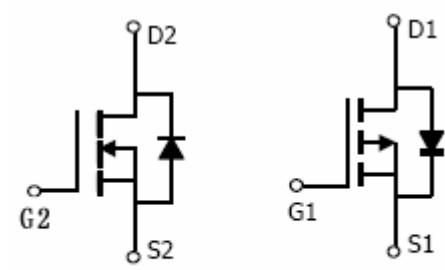


SE4610

Complementary Enhancement Mode Field Effect Transistor

Revision:A

<p>Features</p> <ul style="list-style-type: none"> n-channel, $V_{DS} (V) = 30V$, $I_D = 8.5A$ $R_{DS(ON)} = 18m\Omega$ ($V_{GS}=4.5V$), $R_{DS(ON)} = 21m\Omega$ ($V_{GS}=2.5V$) p-channel, $V_{DS} (V) = -30V$, $I_D = -4.9A$ $R_{DS(ON)} = 18m\Omega$ ($V_{GS} = -4.5V$), $R_{DS(ON)} = 23m\Omega$ ($V_{GS} = -2.5V$) <p>Applications</p> <ul style="list-style-type: none"> Power Management in Desktop or DC/DC Converters <p>Construction</p> <ul style="list-style-type: none"> Silicon epitaxial planer 	<p>External Dimensions: (Unit:mm)</p>  <p style="text-align: center;">SOP-8</p>  <p style="text-align: center;">n-channel p-channel</p>
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Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Max n-channel	Max P-channel	Unit	
Drain-Source Voltage	V_{DS}	30	-30	V	
Gate-Source Voltage	V_{GSS}	± 20	± 20	V	
Drain Current-Continuous@ Current-Pulsed (Note 1)	I_D	TA=25°C	8.5	-5	A
		TA=70°C	7.4	-4	
	I_{DM}	50	-30	A	
Maximum Power Dissipation	P_D	3	2	W	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	°C	

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	62.5	62.5	°C/W
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N-Channel Electrical Characteristics (Tj=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V$, $I_D = 250\mu A$	30			V

SE4610

Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=24V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.9	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=4.5A$		18	33	m Ω
		$V_{GS}=2.5V, I_D=4A$		21	40	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=5A$	10	17		S
DYNAMIC CHARACTERISTICS (Note4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$		680		PF
Output Capacitance	C_{oss}			102		PF
Reverse Transfer Capacitance	C_{rss}			77		PF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=15V, V_{GS}=10V,$ $R_{GEN}=3\Omega, R_L=2.2\Omega$		4.6		nS
Turn-on Rise Time	t_r			4.1		nS
Turn-Off Delay Time	$t_{d(off)}$			20.6		nS
Turn-Off Fall Time	t_f			5.2		nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_{DS}=6.9A,$ $V_{GS}=10V$		13.8		nC
Gate-Source Charge	Q_{gs}			1.8		nC
Gate-Drain Charge	Q_{gd}			3.3		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	$I_{SD}=1A$		0.76	1	V
P-Channel Electrical Characteristics (TJ=25°C unless otherwise noted)						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30			V

SE4610

Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -24V, V_{GS} = 0V$			-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0		-2.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -9A$		18	28	m Ω
		$V_{GS} = -2.5V, I_D = -6A$		23	38	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = -15V, I_D = -4.5A$	5	10		S
DYNAMIC CHARACTERISTICS (Note4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = -15V,$ $V_{GS} = -10V,$ $R_{GEN} = 3\Omega, R_L = 2.7\Omega$		12		nS
Turn-on Rise Time	t_r			3		nS
Turn-Off Delay Time	$t_{d(off)}$			22		nS
Turn-Off Fall Time	t_f			4		nS
Total Gate Charge	Q_g				10	
Gate-Source Charge	Q_{gs}	$V_{DS} = -15V, I_{DS} = -6A,$ $V_{GS} = -10V$		3.3		nC
Gate-Drain Charge	Q_{gd}			1.8		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	$I_{SD} = -1.7A$		-0.8	-1.2	V

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

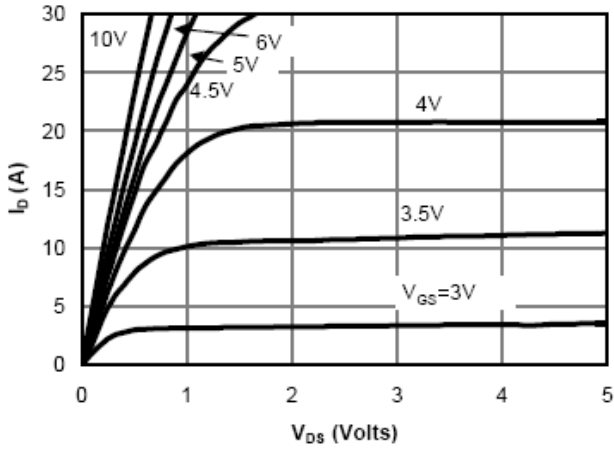


Fig 1: On-Region Characteristics

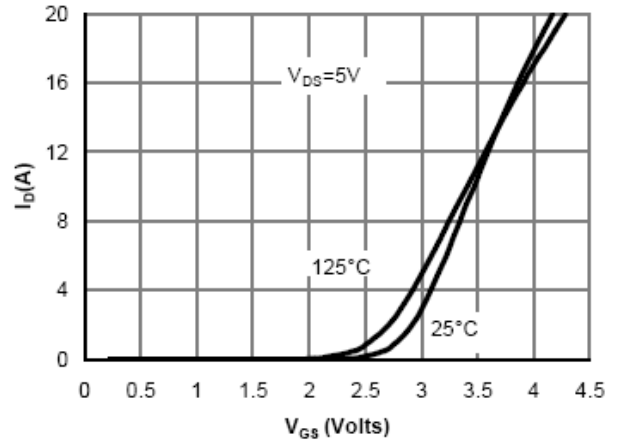


Figure 2: Transfer Characteristics

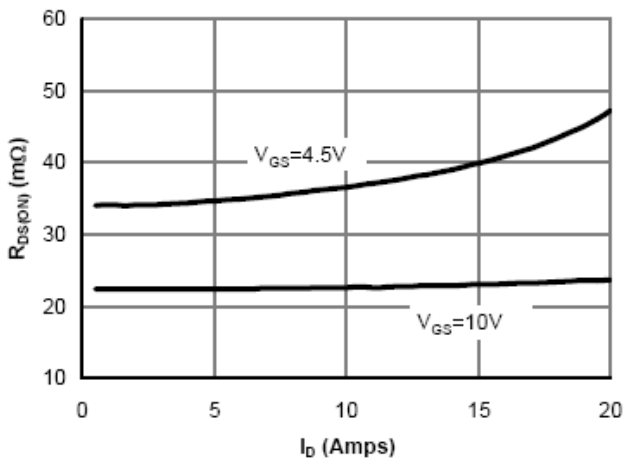


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

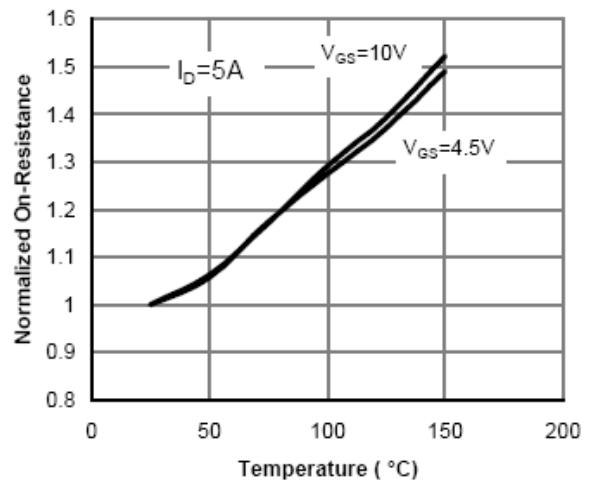


Figure 4: On-Resistance vs. Junction Temperature

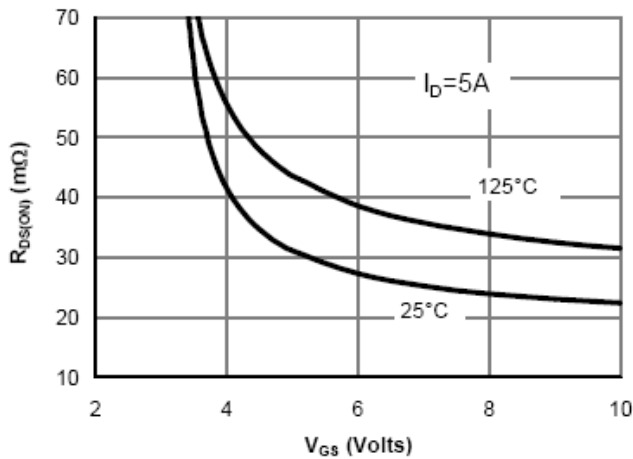


Figure 5: On-Resistance vs. Gate-Source Voltage

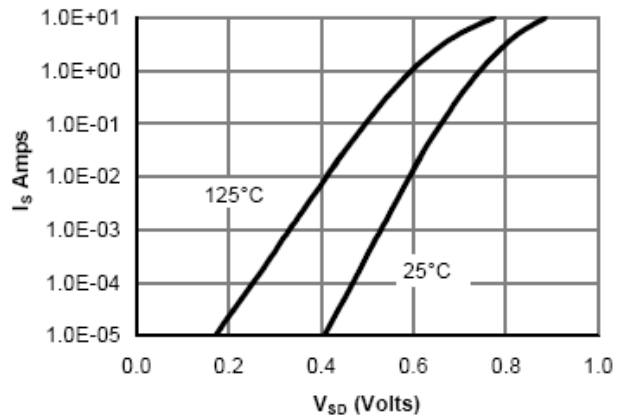


Figure 6: Body diode characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

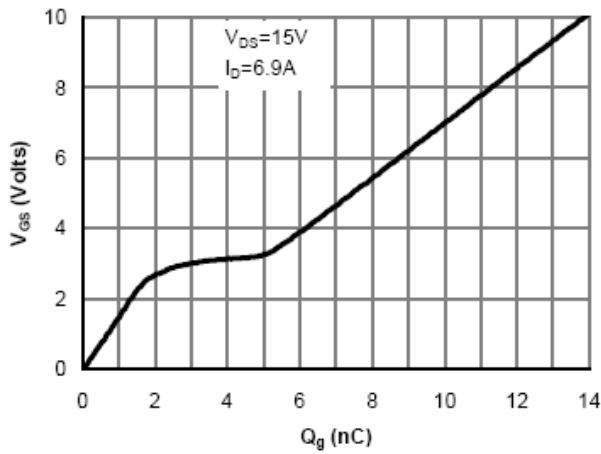


Figure 7: Gate-Charge characteristics

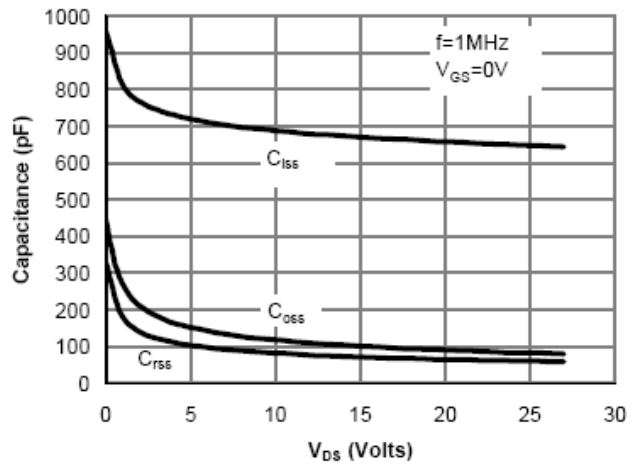


Figure 8: Capacitance Characteristics

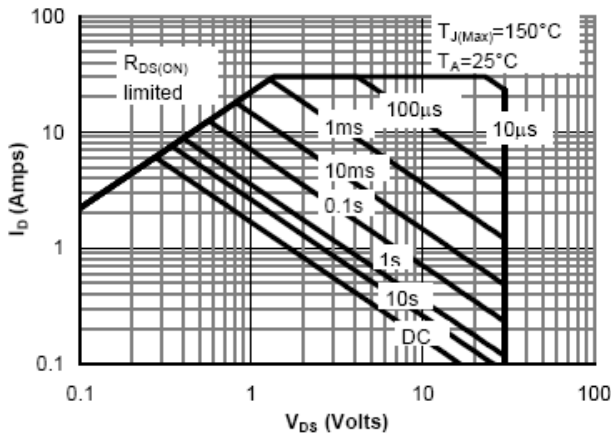


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

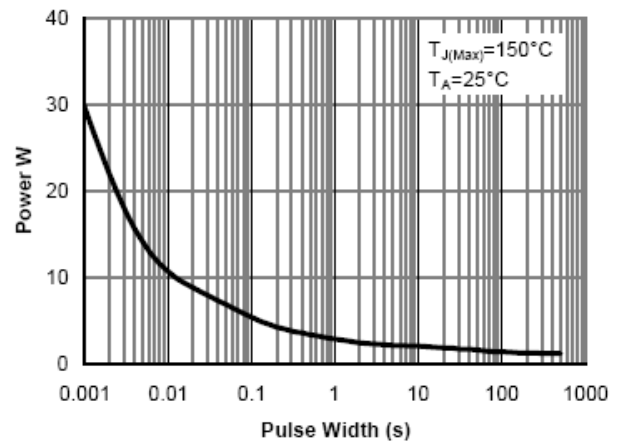


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

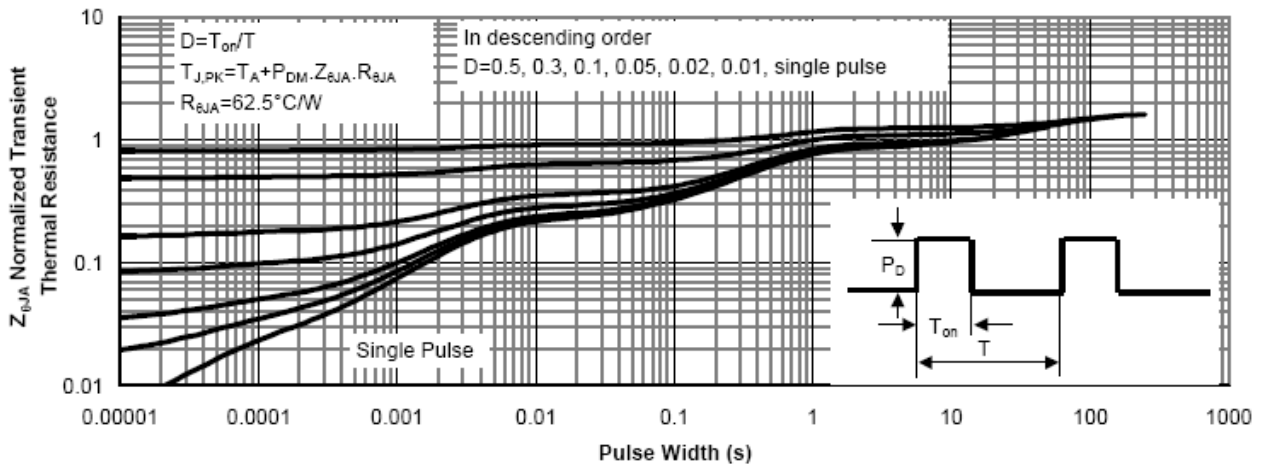


Figure 11: Normalized Maximum Transient Thermal Impedance

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

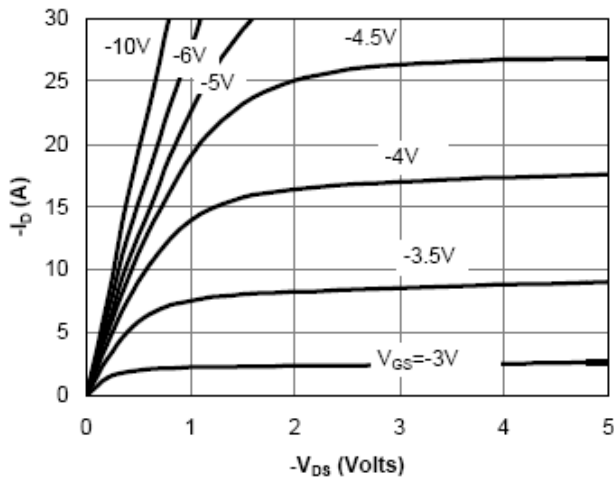


Fig 1: On-Region Characteristics

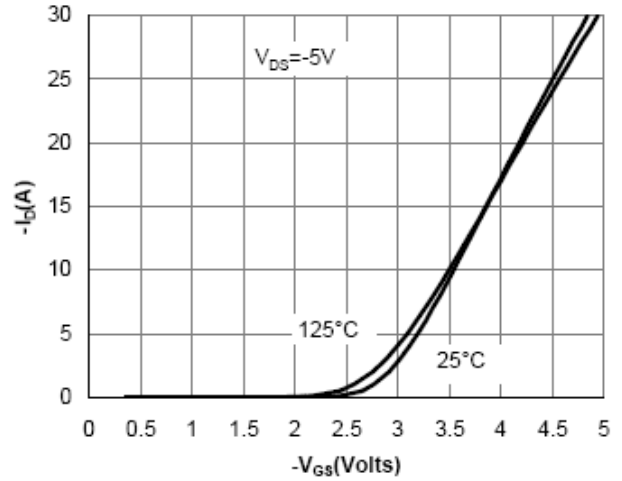


Figure 2: Transfer Characteristics

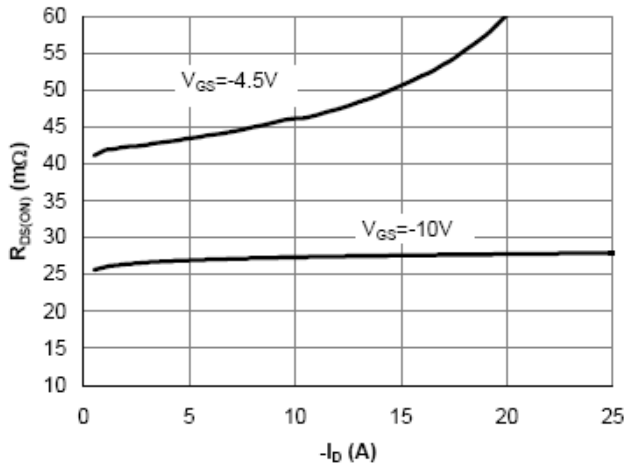


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

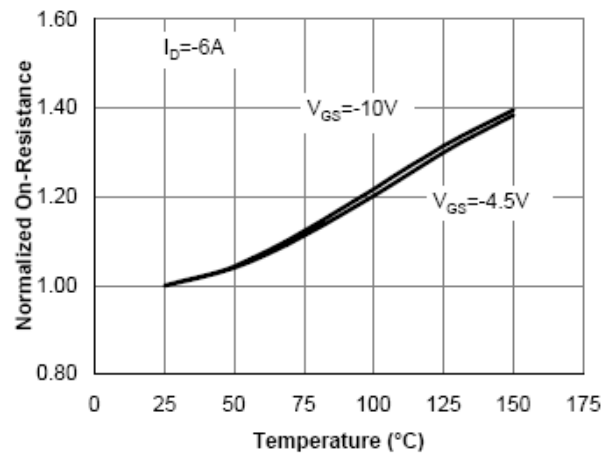


Figure 4: On-Resistance vs. Junction Temperature

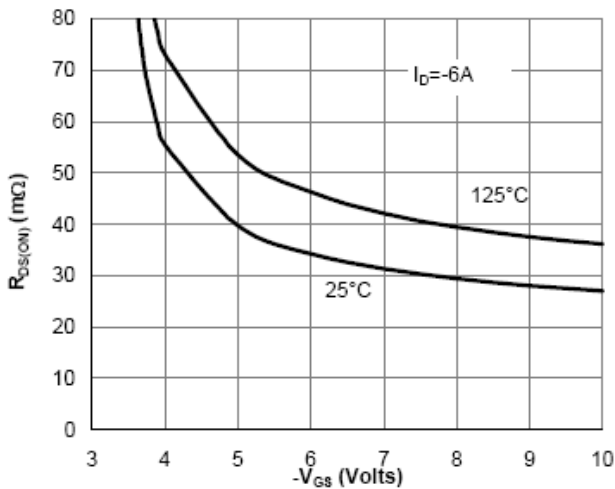


Figure 5: On-Resistance vs. Gate-Source Voltage

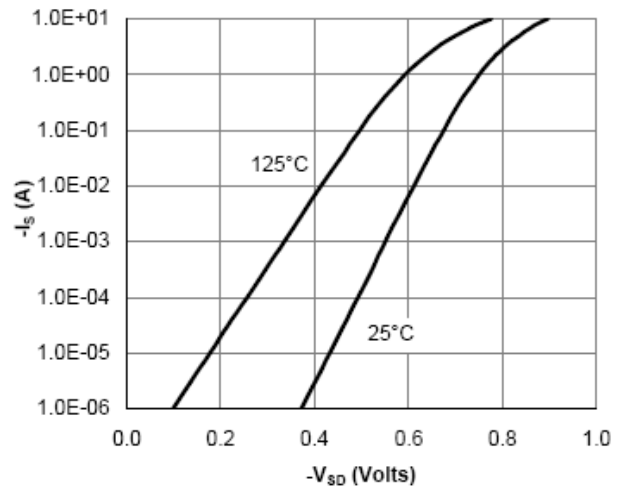


Figure 6: Body-Diode Characteristics

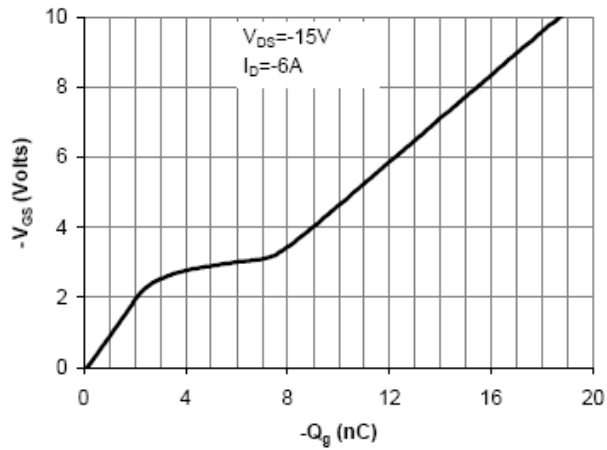


Figure 7: Gate-Charge Characteristics

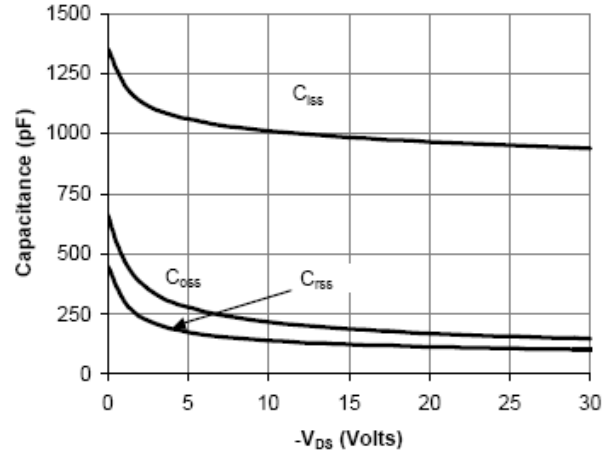


Figure 8: Capacitance Characteristics

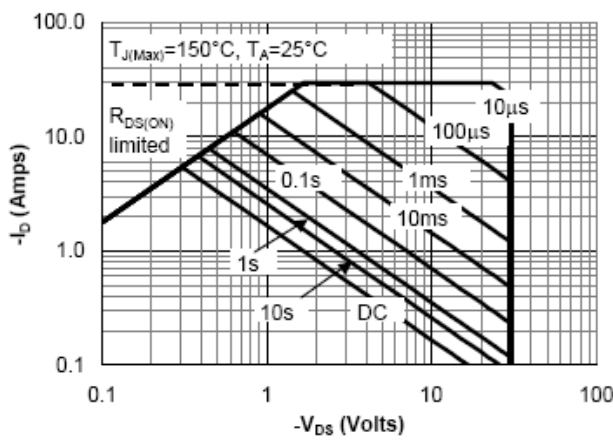


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

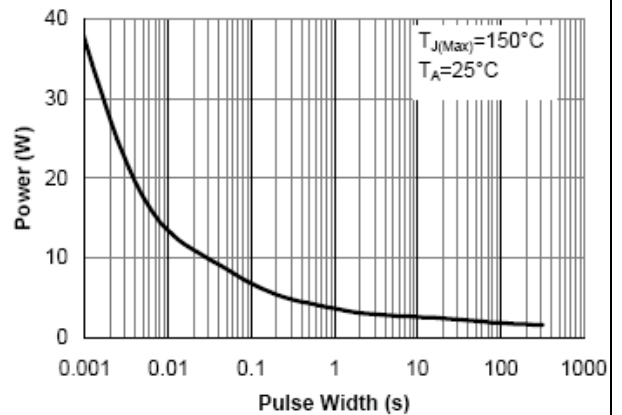


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

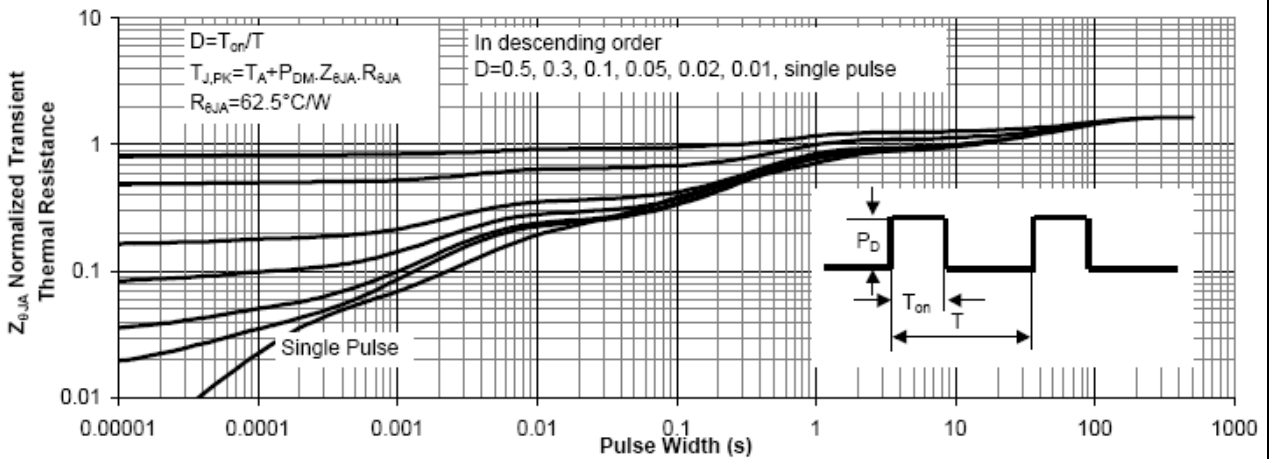
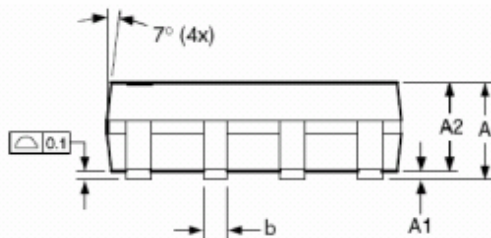
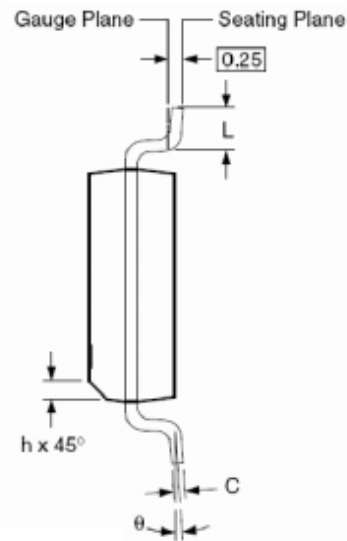
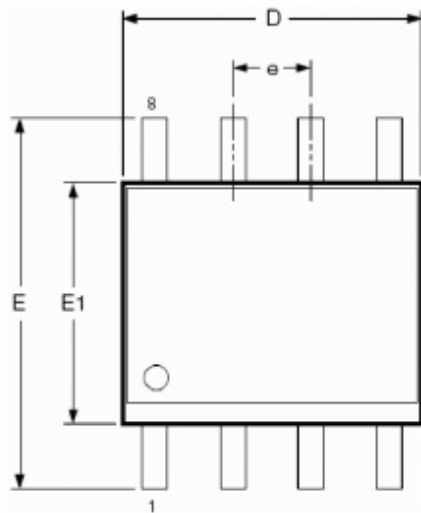


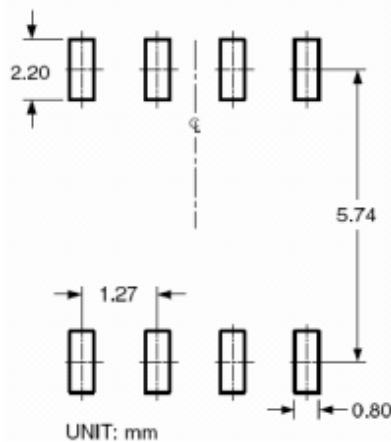
Figure 11: Normalized Maximum Transient Thermal Impedance

SOP-8 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)



RECOMMENDED LAND PATTERN



UNIT: mm

Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	1.35	1.65	1.75
A1	0.10	—	0.25
A2	1.25	1.50	1.65
b	0.31	—	0.51
c	0.17	—	0.25
D	4.80	4.90	5.00
E1	3.80	3.90	4.00
e	1.27 BSC		
E	5.80	6.00	6.20
h	0.25	—	0.50
L	0.40	—	1.27
θ	0°	—	8°

Dimensions in inches

Symbols	Min.	Nom.	Max.
A	0.053	0.065	0.069
A1	0.004	—	0.010
A2	0.049	0.059	0.065
b	0.012	—	0.020
c	0.007	—	0.010
D	0.189	0.193	0.197
E1	0.150	0.154	0.157
e	0.050 BSC		
E	0.228	0.236	0.244
h	0.010	—	0.020
L	0.016	—	0.050
θ	0°	—	8°

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