AP2716SD

N and P-Channel Enhancement Mosfet

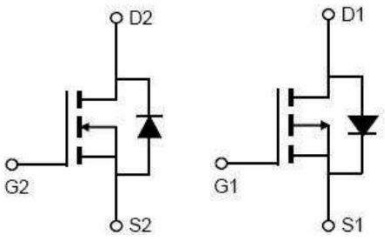
DATA SHEET

Feature

- **N-Channel**
  V_{DD}=40V,I_D=10A
  $R_{DS(ON)}$ <22mΩ @V_{GS}=10V TYP=17mΩ
  $R_{DS(ON)}$ <30mΩ @V_{GS}=4.5V TYP=22mΩ

- **P-Channel**
  V_{DD}=-40V,I_D=-10A
  $R_{DS(ON)}$ <54mΩ @V_{GS}=-10V TYP=44mΩ
  $R_{DS(ON)}$ <70mΩ @V_{GS}=-4.5V TYP=55mΩ

- Lead free product is acquired
- High power and current handing capability
- Surface mount package



N-channel **P-channel**

Schematic diagram

Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2716SD	AP2716SD	SOP-8	13 inch	-	4000

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current (T_a =25℃)	I_D	10	-10	A
Continuous Drain Current (T_a =100℃)	I_D	6.5	-6.5	A
Pulsed Drain Currenr (1)	I_{DM}	40	-40	A
Power Dissipation	P_D	4.0	7.5	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	31.3	16.7	℃/W
Junction Temperature	T_J	150	150	℃
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	℃

N-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =40V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.6	2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =10V, I_D =10A		17	22	mΩ
		V_{GS} =4.5V, I_D =6A		22	30	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz		1050		pF
Output Capacitance	C_{oss}			84		
Reverse Transfer Capacitance	C_{rss}			72		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, I_D=5A, R_L=6Ω V_{GS}=10V, R_G=1Ω		11		ns
Turn-on rise time	t_r			13		
Turn-off delay time	$t_{d(off)}$			36		
Turn-off fall time	t_f			9		
Total Gate Charge	Qg	VDS=20V, ID=5A, VGS=10V		11		nC
Gate-Source Charge	Qgs			1.9		
Gate-Drain Charge	Qgd			2.2		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=10A			1.2	V
Diode Forward current(3)	I_S		-	-	10	A

P-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-40V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.6	-2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-10A		44	54	mΩ
		V_{GS} =-4.5V, I_D =-6A		55	70	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-20V, V_{GS} =0V, f =1MHz		1160		pF
Output Capacitance	C_{oss}			155		
Reverse Transfer Capacitance	C_{rss}			98		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-20V, I_D=-5A, R_L=6Ω V_{GS}=-10V, R_G=1Ω		8		ns
Turn-on rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			23		
Turn-off fall time	t_f			9		
Total Gate Charge	Qg	VDS=-20V, ID=-5A, VGS=-10V		20		nC
Gate-Source Charge	Qgs			3.5		
Gate-Drain Charge	Qgd			4.2		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=-10A			1.2	V
Diode Forward current(3)	I_S		-	-	-10	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width≤300μs, duty cycle≤2%
3. Surface Mounted on FR4 Board,t≤10 sec

N-Channel

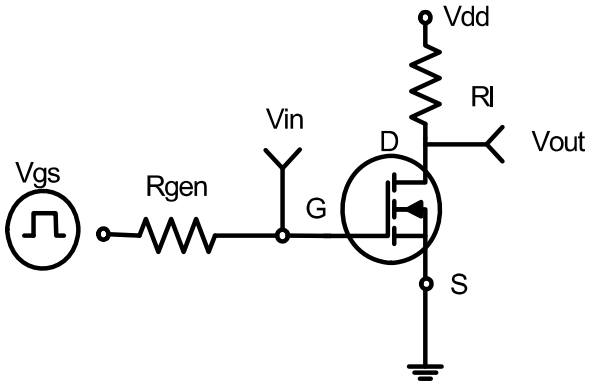


Figure 1:Switching Test Circuit

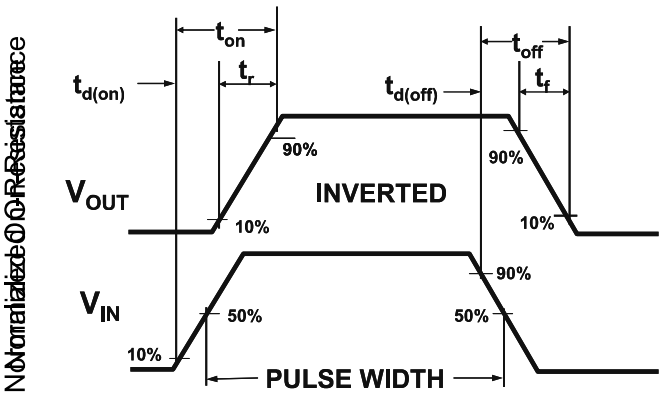
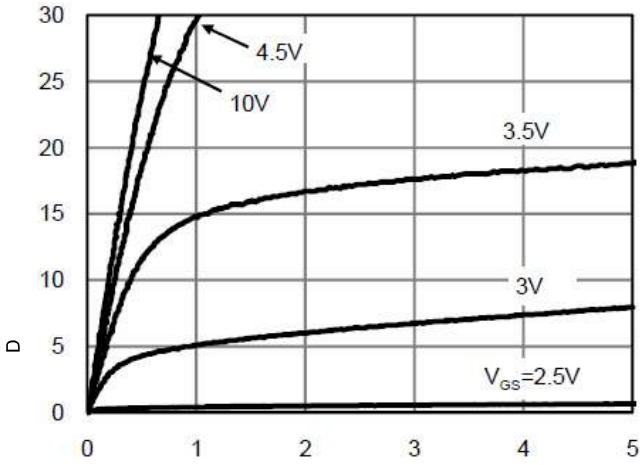
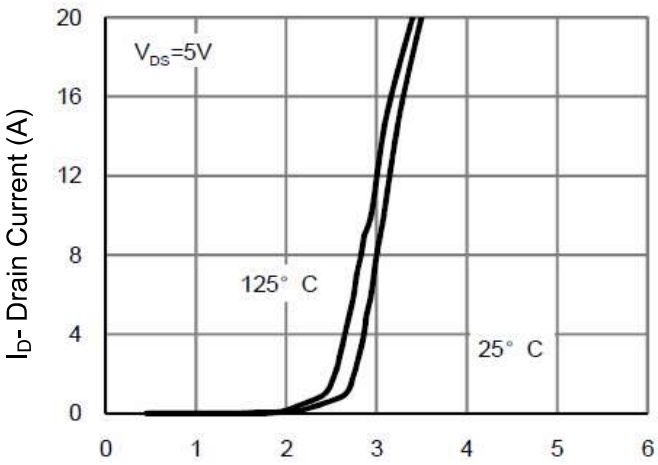


Figure 2:Switching Waveforms



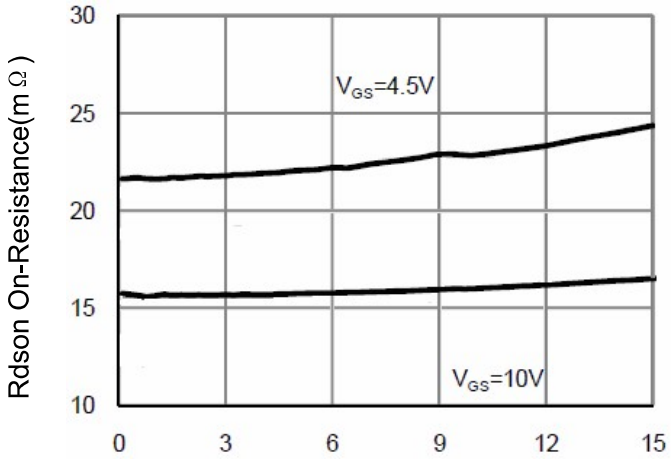
Vds Drain-Source Voltage (V)

Figure 3 Output Characteristics



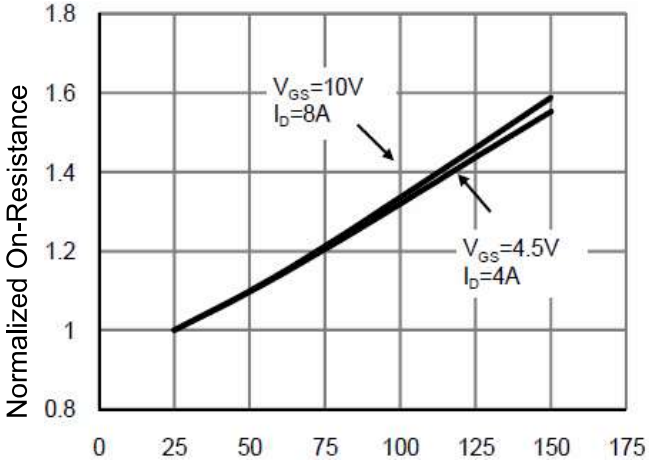
Vgs Gate-Source Voltage (V)

Figure 4 Transfer Characteristics



I_D- Drain Current (A)

Figure 5 Drain-Source On-Resistance



T_J-Junction Temperature(℃)

Figure 6 Drain-Source On-Resistance

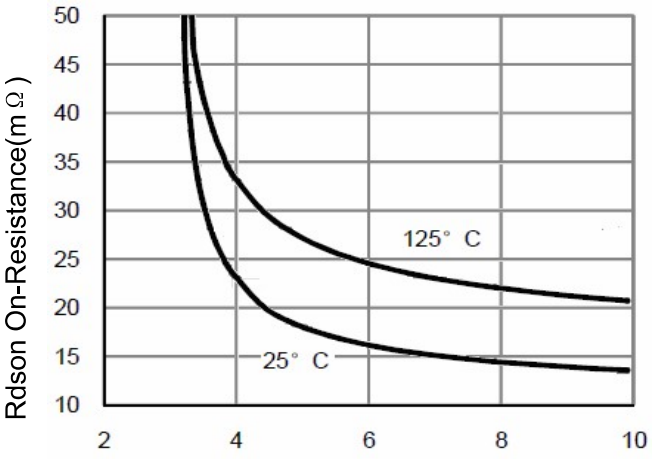


Figure7 Rdson vs Vgs

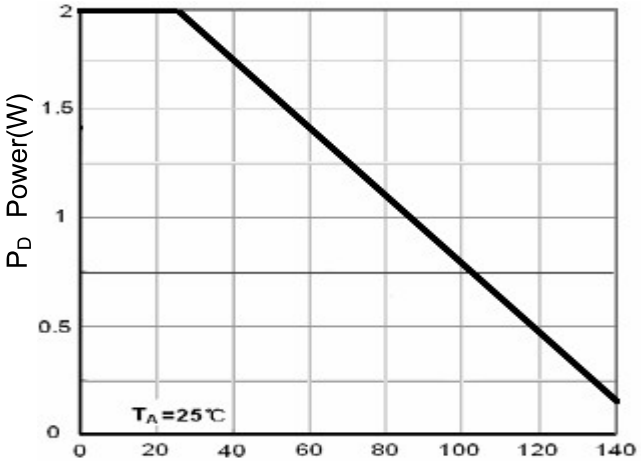


Figure 8 Power Dissipation

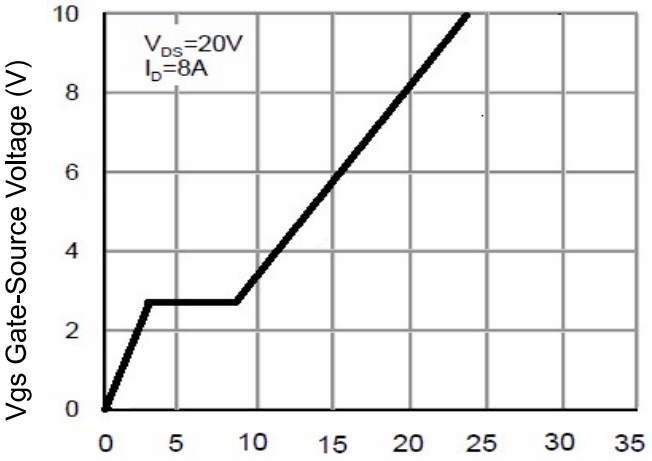


Figure 9 Gate Charge

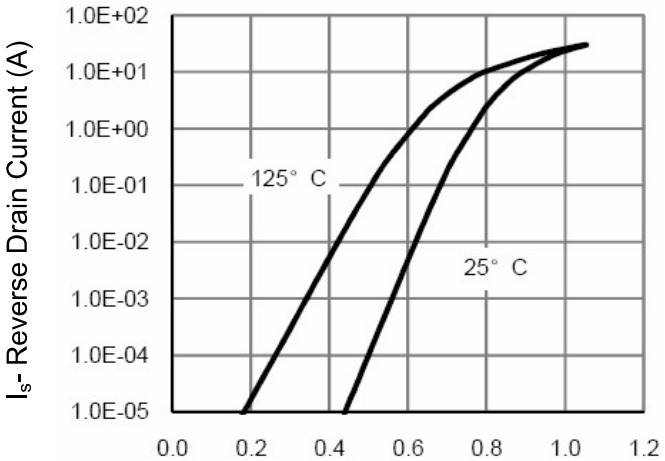


Figure 10 Source- Drain Diode Forward

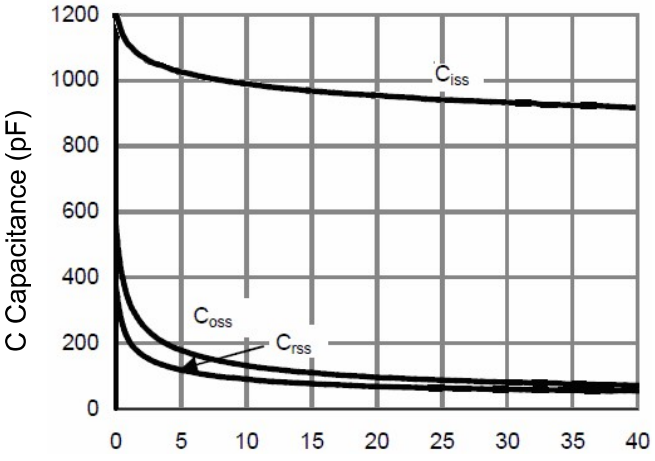


Figure 11 Capacitance vs Vds

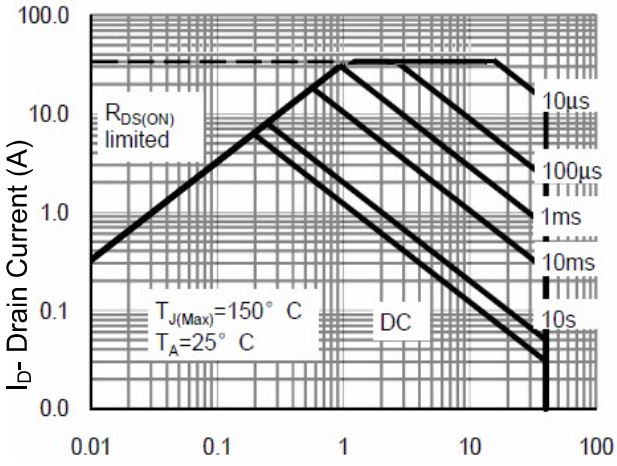


Figure 12 Safe Operation Area

P-Channel

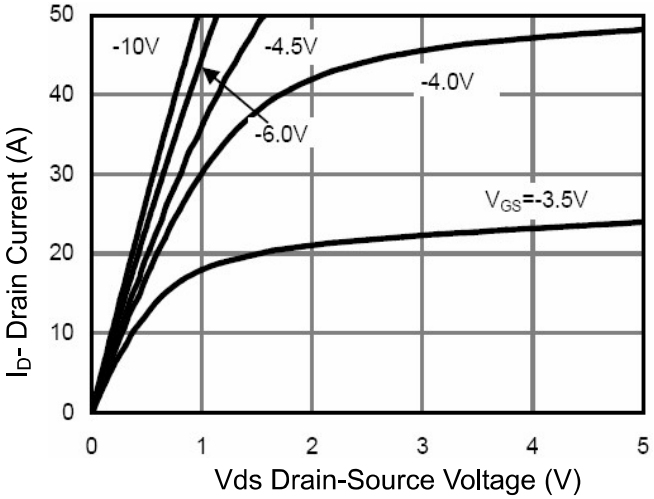


Figure 1 Output Characteristics

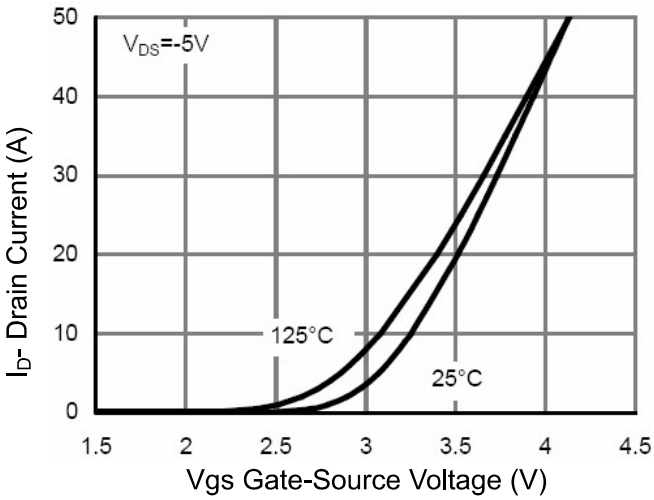


Figure 2 Transfer Characteristics

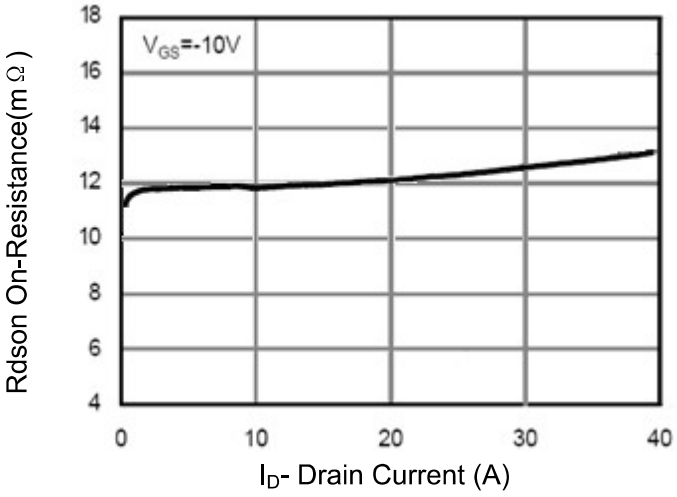


Figure 3 Rdson- Drain Current

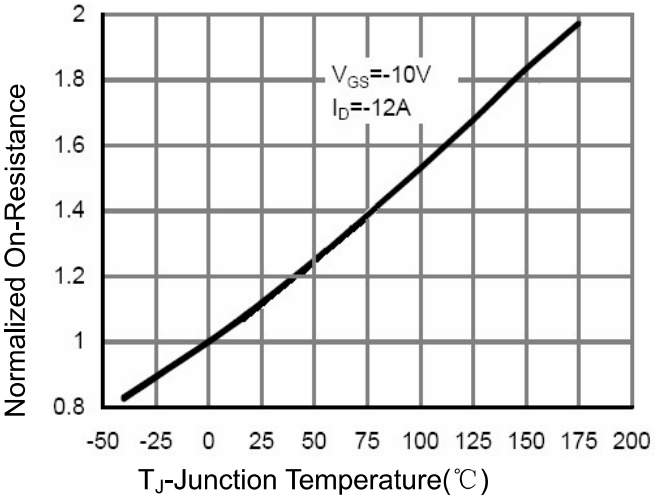


Figure 4 Rdson-Junction Temperature

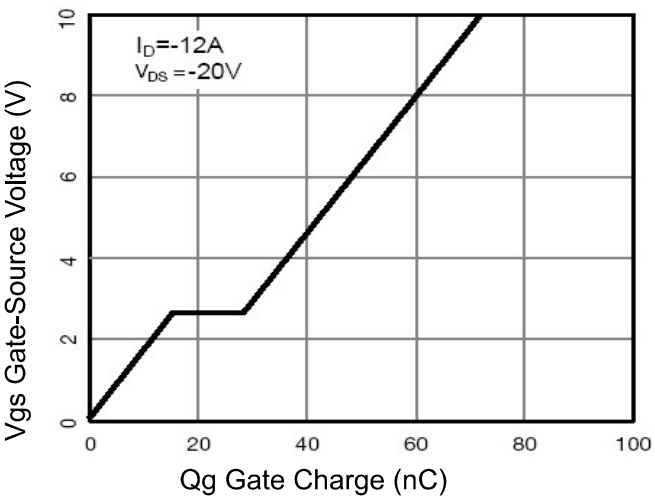


Figure 5 Gate Charge

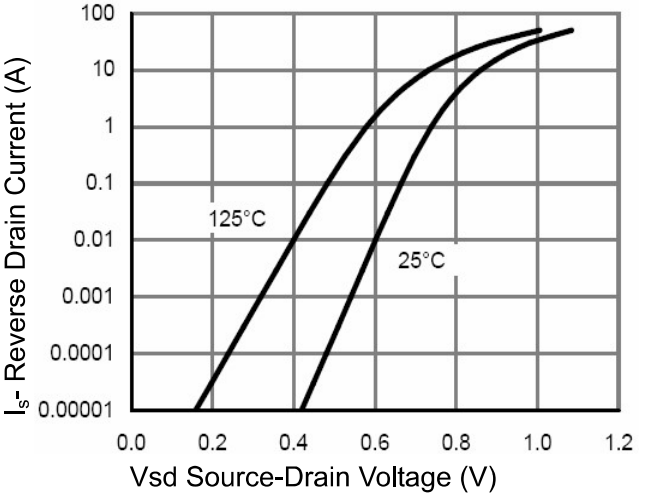


Figure 6 Source- Drain Diode Forward

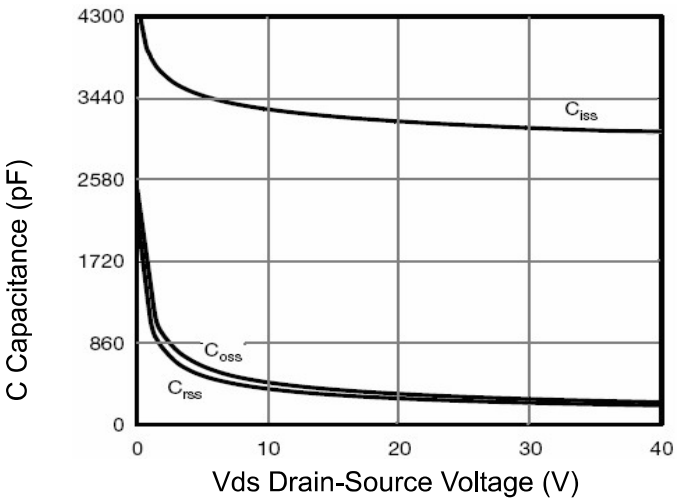


Figure 7 Capacitance vs Vds

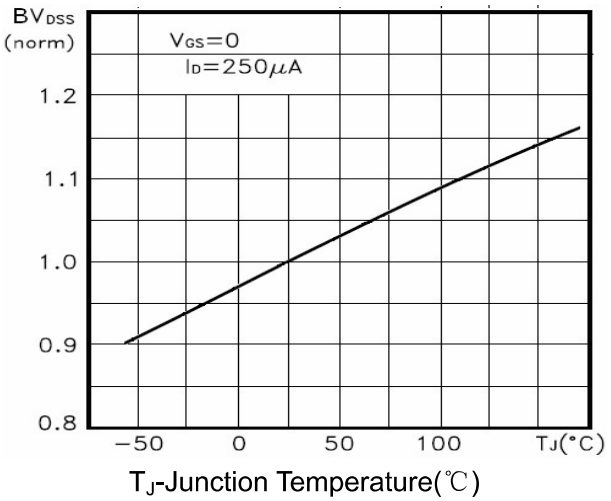


Figure 9 BV_{DSS} vs Junction Temperature

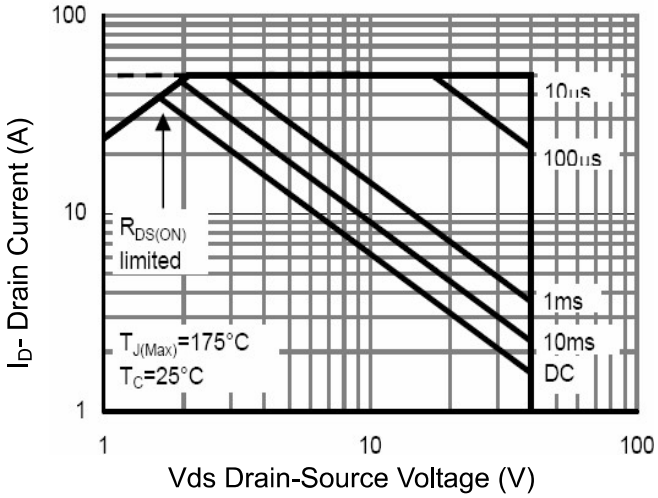


Figure 8 Safe Operation Area

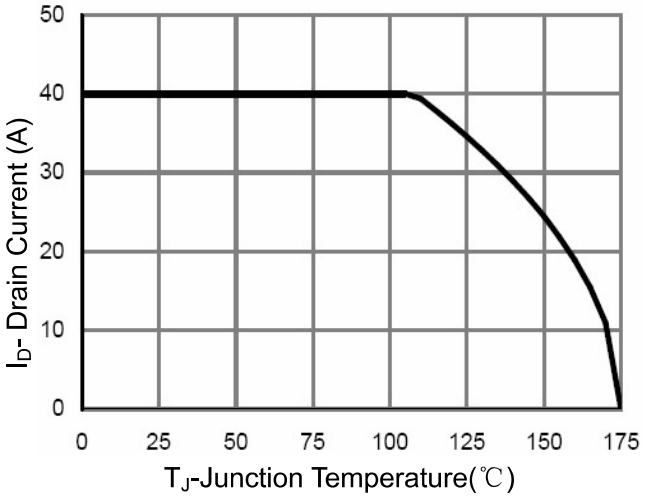


Figure 10 ID Current Derating vs Junction Temperature

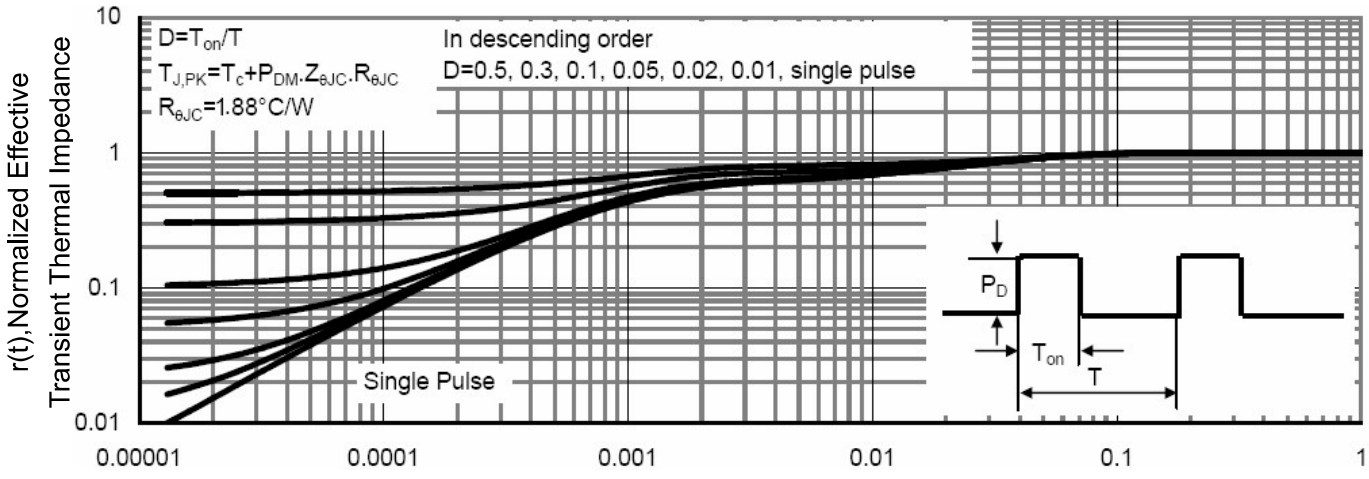
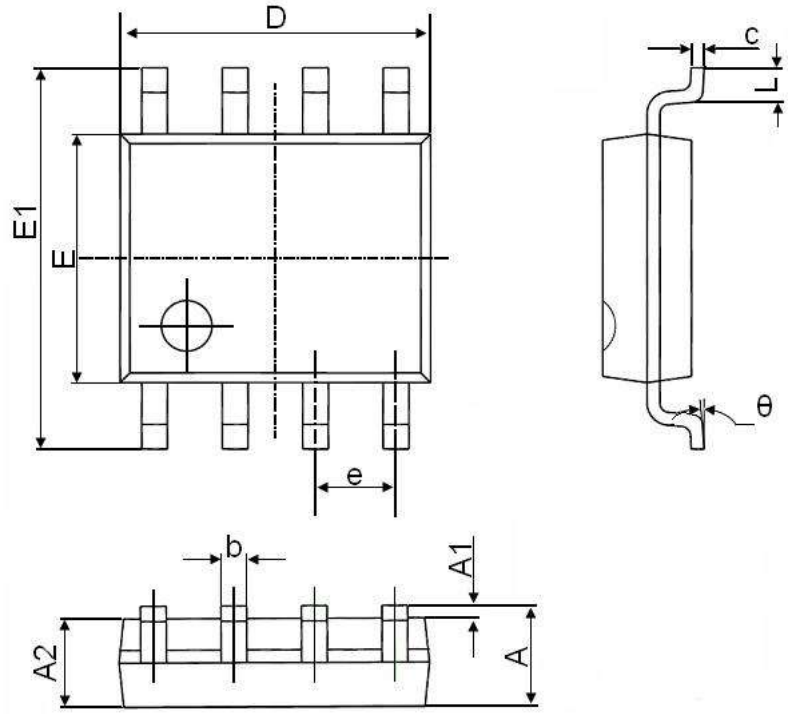


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°