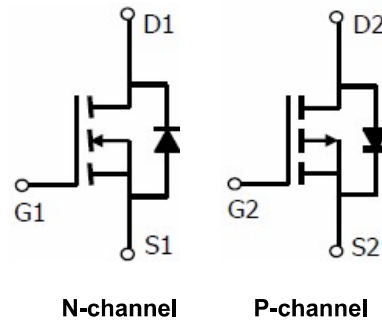


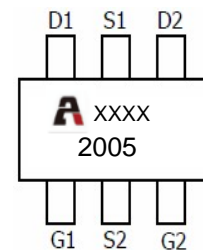
Feature

- **N-Channel**
 $V_{DD}=20V, I_D=6.8A$
 $R_{DS(on)} < 18m\Omega @ V_{GS}=4.5V \text{ Typ}=13.5m\Omega$
 $R_{DS(on)} < 26m\Omega @ V_{GS}=2.5V \text{ Typ}=16m\Omega$
- **P-Channel**
 $V_{DD}=-20V, I_D=-5.5A$
 $R_{DS(on)} < 42m\Omega @ V_{GS}=-4.5V \text{ Typ}=32m\Omega$
 $R_{DS(on)} < 75m\Omega @ V_{GS}=-2.5V \text{ Typ}=50m\Omega$
- Lead free product is acquired
- High power and current handling capability
- Surface mount package



Application

- Interfacing Switching
- Load Switching
- Power management



Marking and pin assignment

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2005	AP2005	SOT23-6	-	-	3000

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 12	± 12	V
Continuous Drain Current ($T_a = 25^\circ C$)	I_D	6.8	-5.5	A
Continuous Drain Current ($T_a = 100^\circ C$)	I_D	4.4	-3.6	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	27	-20	A
Power Dissipation	P_D	1.7	1.7	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	74	74	$^\circ C/W$
Junction Temperature	T_J	150	150	$^\circ C$
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	$^\circ C$

N-CH ELECTRICAL CHARACTERISTICS(T_a=25°C 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	20	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =20V, V _{GS} = 0V	-	-	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} =±12V, V _{DS} = 0V	-	-	±100	nA
Gate threshold voltage ⁽³⁾	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.3	0.7	1.0	V
Drain-source on-resistance ⁽³⁾	R _{DS(on)}	V _{GS} =4.5V, I _D =4A	-	13.5	18	mΩ
		V _{GS} =2.5V, I _D =3A	-	16	26	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, f =1MHz	-	780	-	pF
Output Capacitance	C _{oss}		-	140	-	
Reverse Transfer Capacitance	C _{rss}		-	80	-	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =10V, I _D =3.5A, V _{GS} =4.5V, R _G =3Ω	-	10	-	ns
Turn-on rise time	t _r		-	30	-	
Turn-off delay time	t _{d(off)}		-	30	-	
Turn-off fall time	t _f		-	34	-	
Total Gate Charge	Q _g	V _{DS} =10V, I _D =3.5A, V _{GS} =4.5V	-	9	-	nC
Gate-Source Charge	Q _{gs}		-	1.2	-	
Gate-Drain Charge	Q _{gd}		-	2.5	-	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V _{DS}	V _{GS} =0V, I _S =6.8A	-	-	1.2	V
Diode Forward current ⁽⁴⁾	I _S		-	-	6.8	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

P-CH ELECTRICAL CHARACTERISTICS($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -20V, V_{GS} = 0V$			-1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 12V, V_{DS} = 0V$			± 100	nA
Gate threshold voltage ⁽²⁾	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.45	-0.7	-1	V
Drain-source on-resistance ⁽²⁾	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -4.5A$		32	42	m Ω
		$V_{GS} = -2.5V, I_D = -3A$		50	75	
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DD} = -4V, V_{GS} = 0V, f = 1MHz$		740		pF
Output Capacitance	C_{oss}			290		
Reverse Transfer Capacitance	C_{rss}			190		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -4V, I_D = -3.5A,$ $R_L = 1.2\Omega, V_{GS} = -4.5V, R_G = 1\Omega$		12		ns
Turn-on rise time	t_r			35		
Turn-off delay time	$t_{d(off)}$			30		
Turn-off fall time	t_f			10		
Total Gate Charge	Q_g	$V_{DS} = -4V, I_D = -3.5A,$ $V_{GS} = -4.5V$		7.8		nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			1.6		
Source-Drain Diode characteristics						
Diode Forward voltage ⁽²⁾	V_{DS}	$V_{GS} = 0V, I_S = -1.6A$			1.2	V
Diode Forward current ⁽³⁾	I_S		-	-	-5.5	A

Notes:

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

N-Channel

Figure 1: Output Characteristics

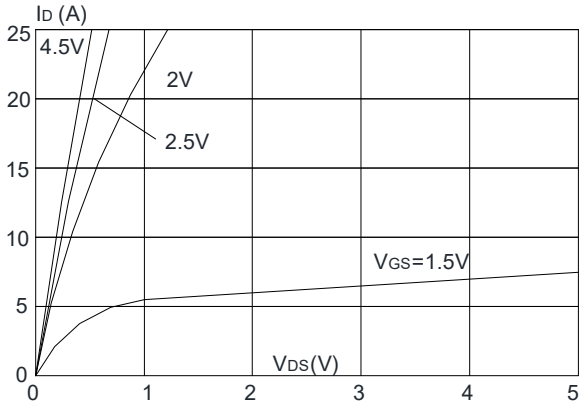


Figure 2: Typical Transfer Characteristics

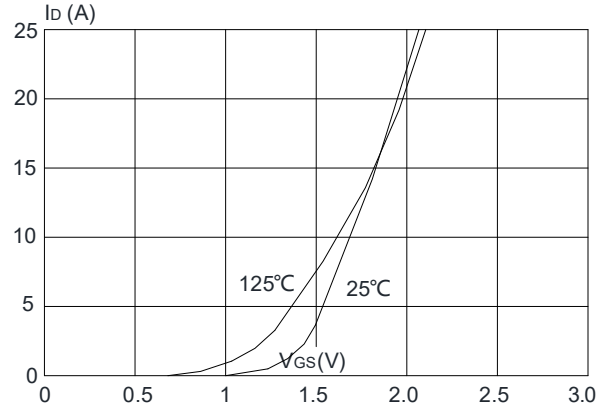


Figure 3: On-resistance vs. Drain Current

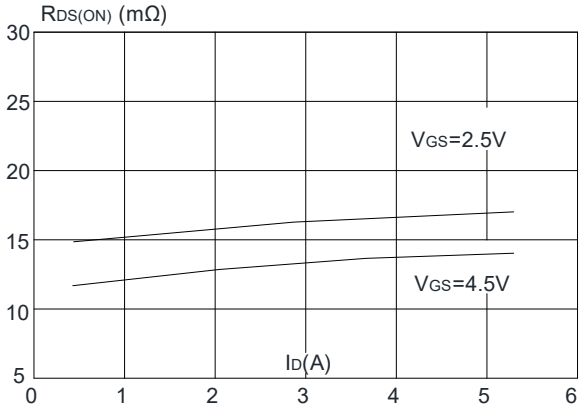


Figure 4: Body Diode Characteristics

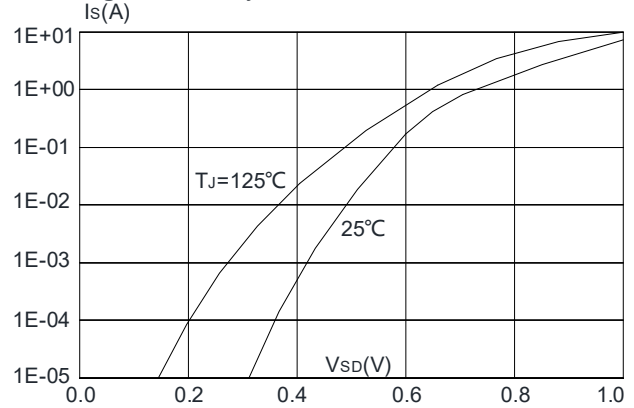


Figure 5: Gate Charge Characteristics

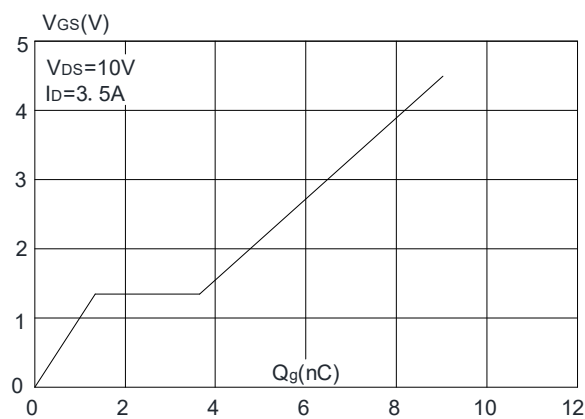
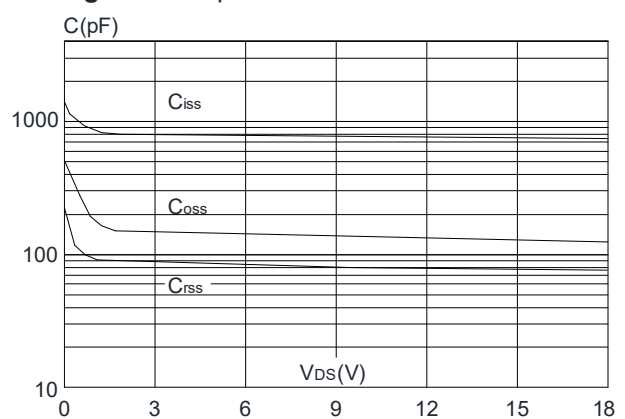


Figure 6: Capacitance Characteristics



N-Channel

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

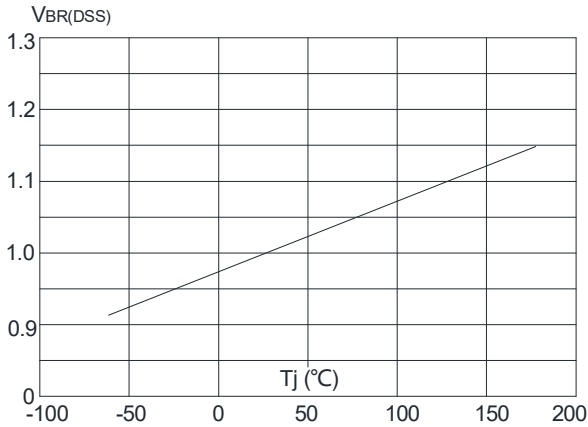


Figure 8: Normalized on Resistance vs. Junction Temperature

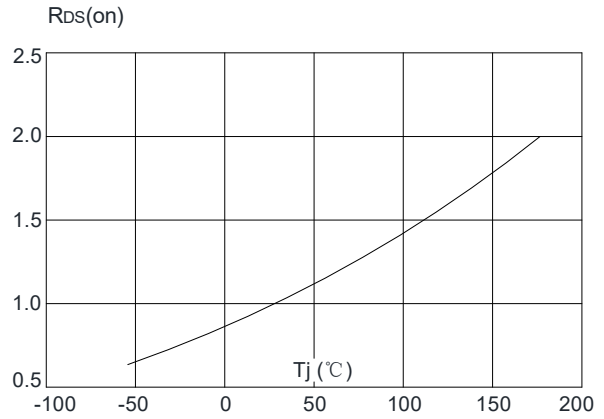


Figure 9: Maximum Safe Operating Area

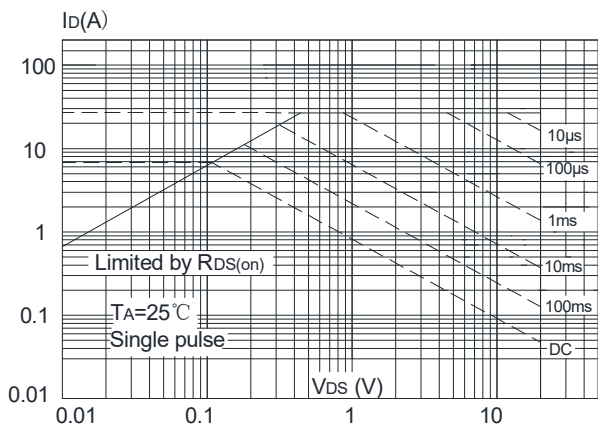


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

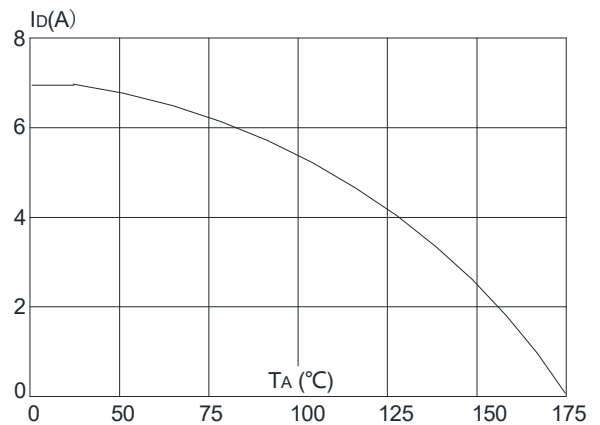
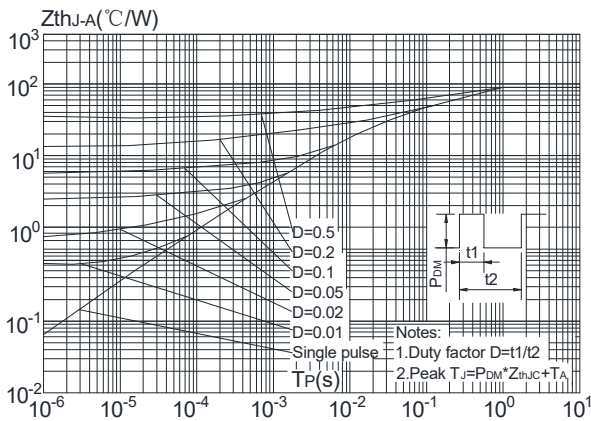


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



P-Channel

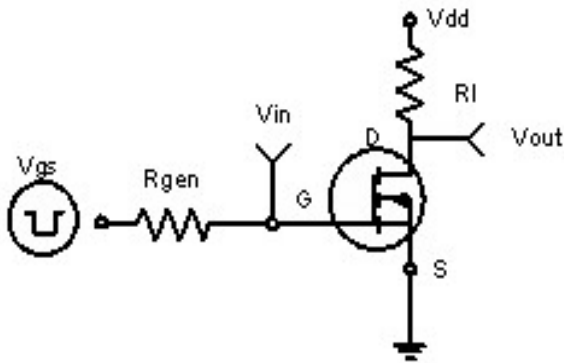


Figure 1: Switching Test Circuit

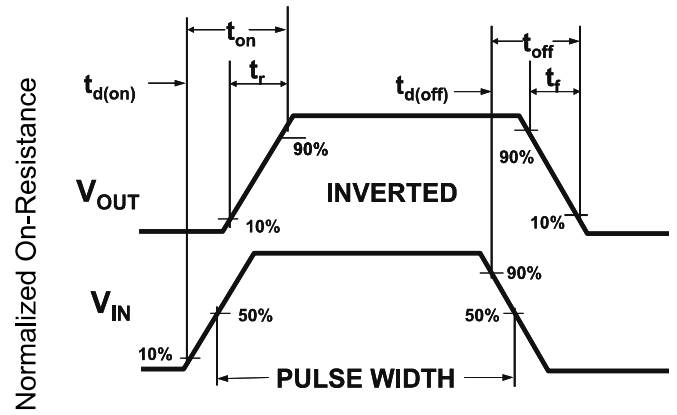


Figure 2: Switching Waveforms

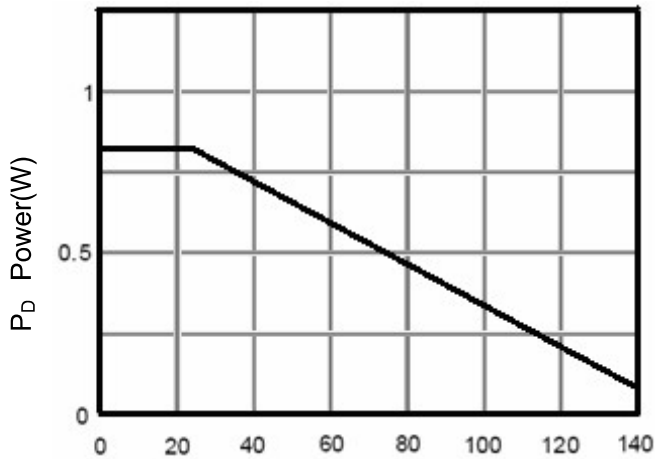


Figure 3 Power Dissipation

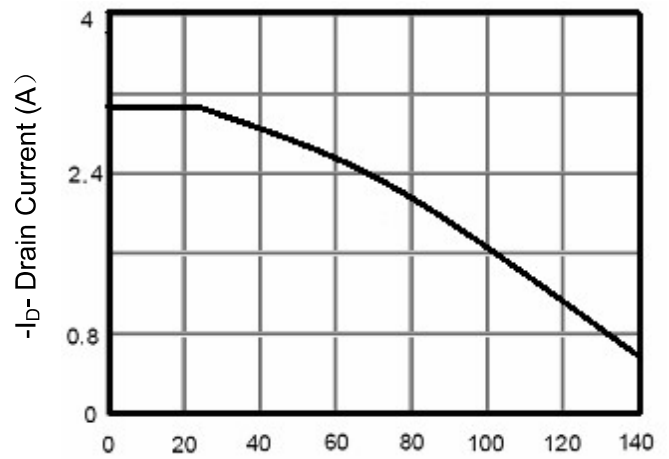


Figure 4 Drain Current

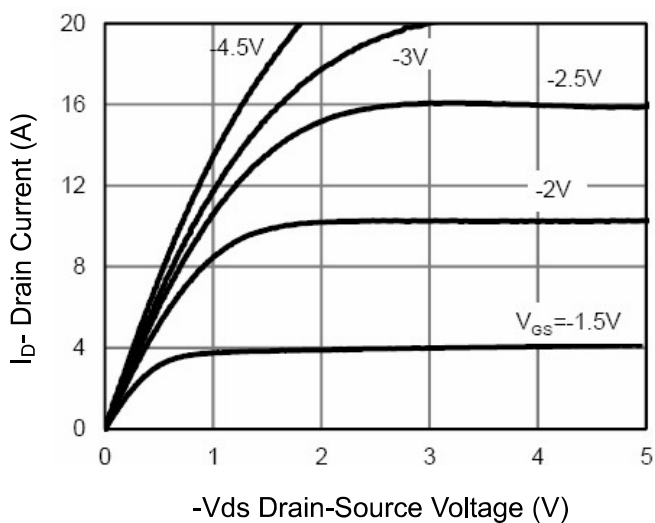


Figure 5 Output Characteristics

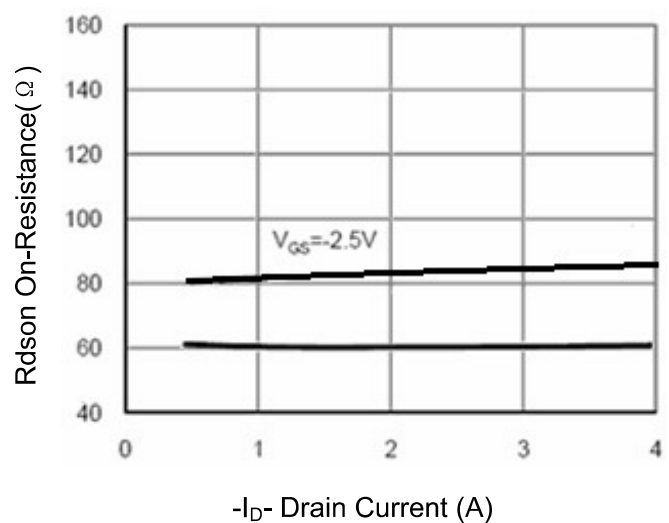


Figure 6 Drain-Source On-Resistance

P-Channel

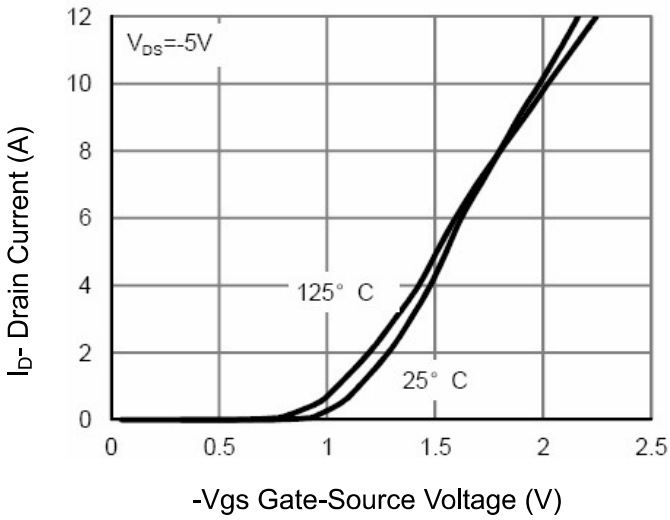


Figure 7 Transfer Characteristics

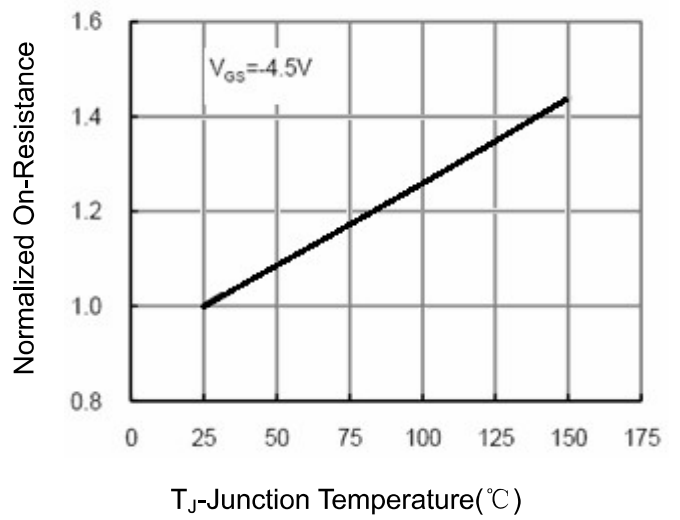


Figure 8 Drain-Source On-Resistance

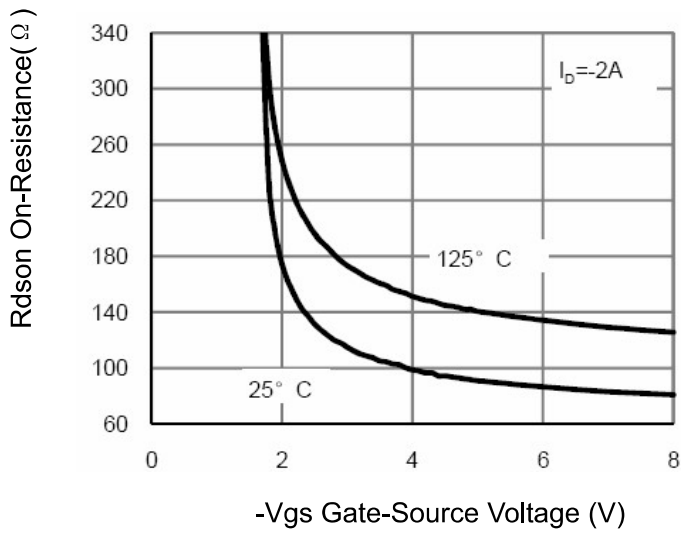


Figure 9 $R_{DS(on)}$ vs V_{GS}

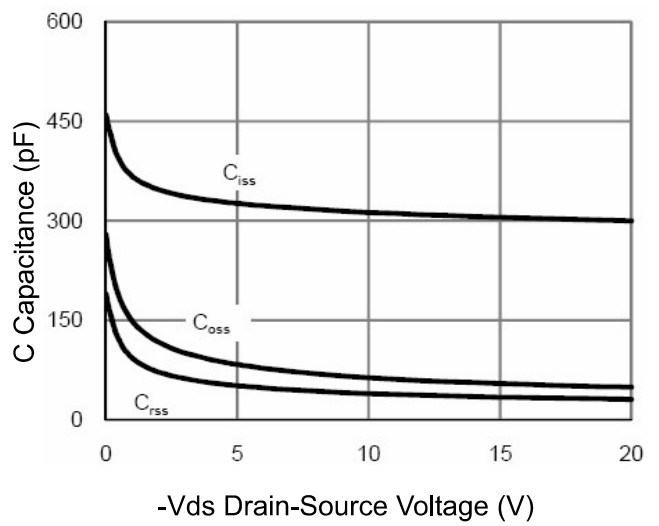


Figure 10 Capacitance vs V_{DS}

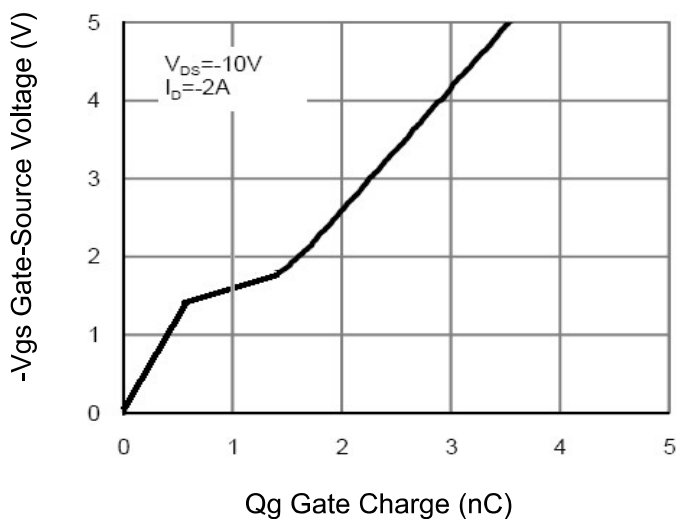


Figure 11 Gate Charge

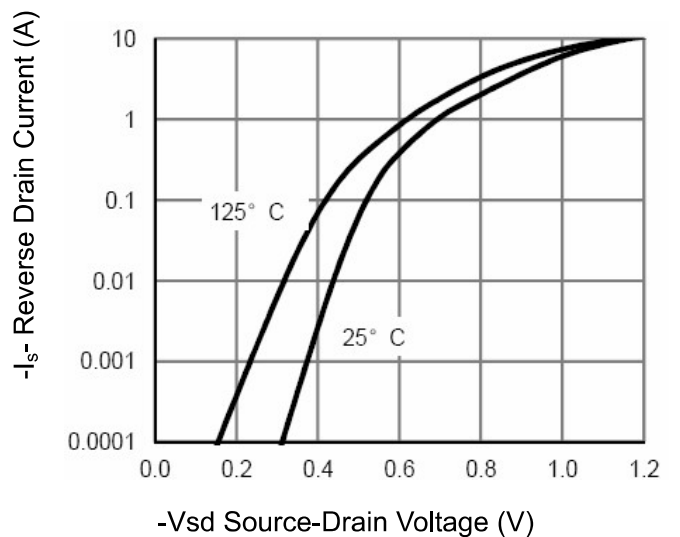
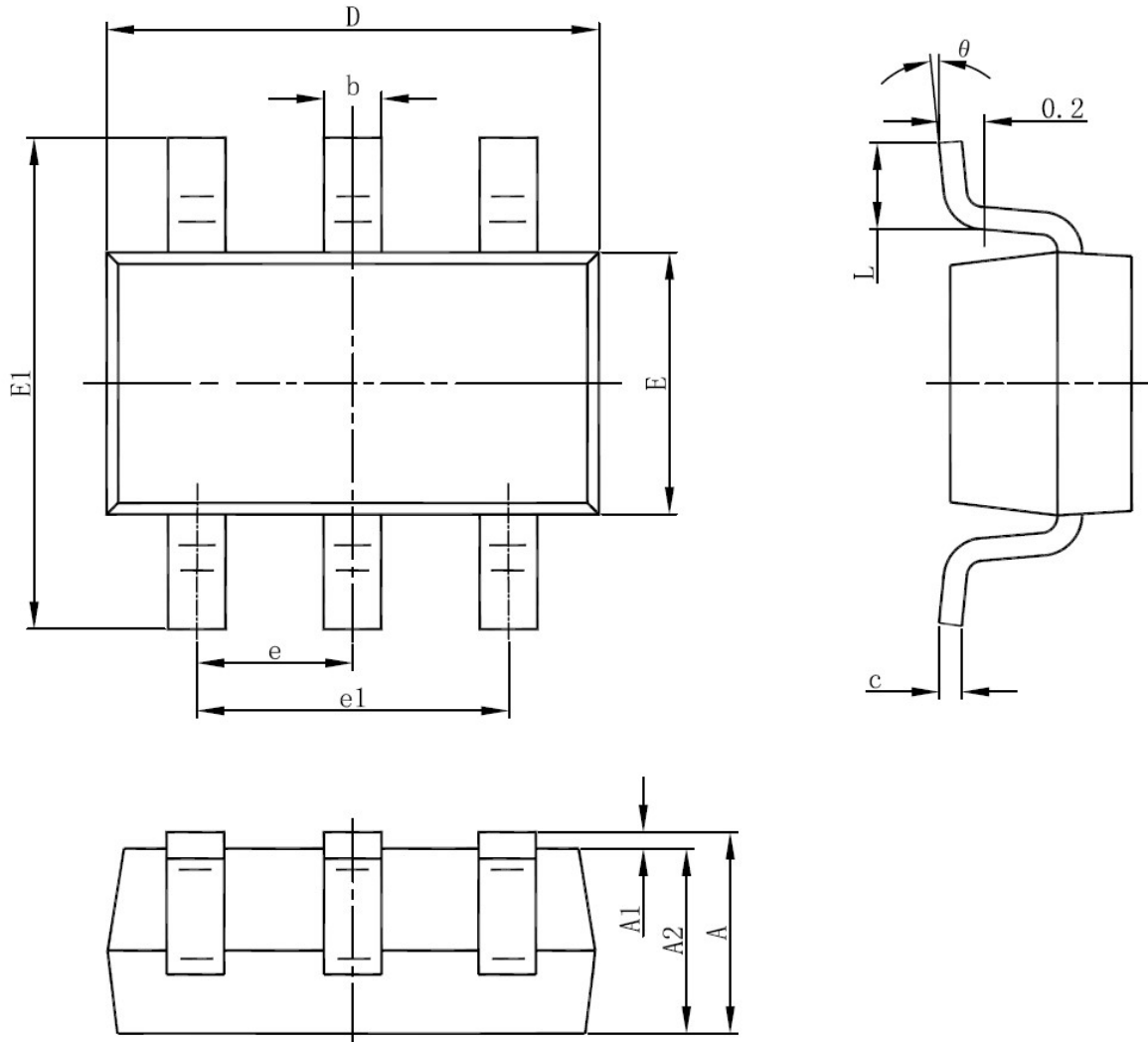


Figure 12 Source- Drain Diode Forward

AP2005

N and P-Channel Enhancement Mosfet

SOT23-6L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°