

• General Description

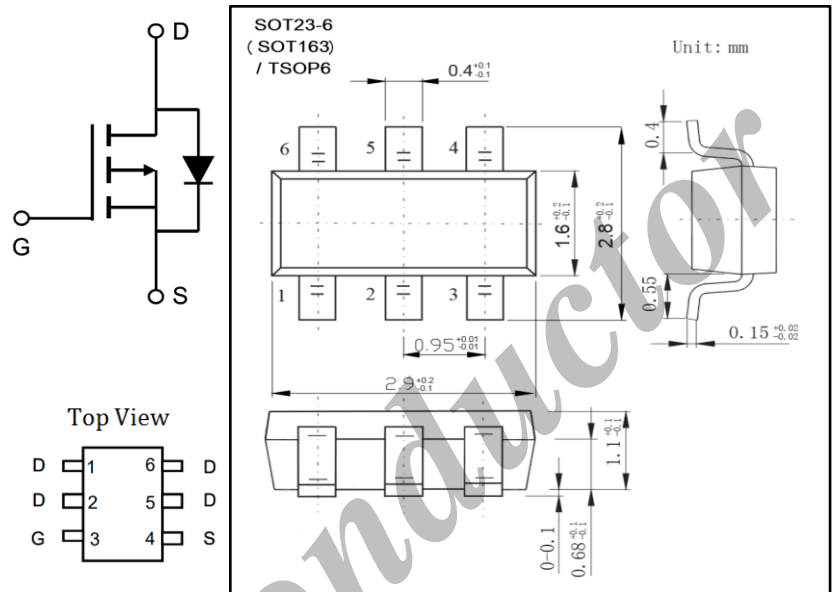
AP6405 combines advanced MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is most suitable to load switch or PWM applications.

• Applications

- DC-DC converter for portable devices
- Load switch

• Product Summary

V_{DS}	.30V
I_D (at $V_{GS} = -10V$)	-5.0A
$R_{DS(ON)}$ (at $V_{GS} = -10V$)	< 52m Ω
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$)	< 87m Ω



• Absolute Maximum Ratings $T_a = 25^\circ C$

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_j = 150^\circ C$)	I_D	$T_a = 25^\circ C$	-5
		$T_a = 70^\circ C$	-4.2
Pulsed Drain Current	I_{DM}	-20	A
Power Dissipation	P_D	$T_a = 25^\circ C$	2
		$T_a = 70^\circ C$	1.3
Junction and Storage Temperature Range	T_j, T_{STG}	-55 to 150	$^\circ C$
Thermal Characteristics			
Thermal Resistance. Junction-to-Ambient	$R_{\theta JA}$	$t \leq 10s$	62.5
		Steady-State	110
Thermal Resistance. Junction-to-Lead	$R_{\theta JL}$	50	$^\circ C/W$

• **Electrical Characteristics Ta = 25°C**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	V_{DS}	$I_D = -250\mu A, V_{GS} = 0V$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$			-1	μA
		$V_{DS} = -30V, V_{GS} = 0V, T_J = 55^\circ C$			-5	
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.4	-1.9	-2.4	V
On-State Drain Current	$I_{D(ON)}$	$V_{DS} = -10V, V_{GS} = -5V$	-20			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -5A$			52	m Ω
		$V_{GS} = -10V, I_D = -5A, T_J = 125^\circ C$			70	
		$V_{GS} = -4.5V, I_D = -4A$			87	
Forward Transconductance	g_{FS}	$V_{DS} = -5V, I_D = -5A$		10		S
Diode Forward Voltage	V_{SD}	$I_S = -1A, V_{GS} = 0V$		-0.7	-1	V
Maximum Body-Diode Continuous Current	I_S				-2.5	A
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = -15V, f = 1MHz$		520		pF
Output Capacitance	C_{oss}			100		
Reverse Transfer Capacitance	C_{rss}			65		
Gate Resistance	R_g	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$	3.5	7.5	11.5	Ω
Switching Parameters						
Total Gate Charge	$Q_g(10V)$	$V_{GS} = -10V, V_{DS} = -15V, I_D = -5A$		9.2	11	nC
	$Q_g(4.5V)$			4.6	6	
Gate Source Charge	Q_{gs}			1.6		
Gate Drain Charge	Q_{gd}			2.2		
Turn-On Delay Time	$t_{D(on)}$	$V_{GS} = -10V, V_{DS} = -15V, R_L = 3\Omega, R_{GEN} = 3\Omega$		7.5		ns
Turn-On Rise Time	t_r			5.5		
Turn-Off Delay Time	$t_{D(off)}$			19		
Turn-Off Fall Time	t_f			7		
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -5A, d_i/d_t = 100A/\mu s$		11		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = -5A, d_i/d_t = 100A/\mu s$		5.3		nC

• **Ordering Information**

Ordering Part Number	Package	MOQ
AP6405	SOT23-6 (SOT163) / TSOP6	3,000 pcs / reel

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• Typical Electrical and Thermal Characteristics

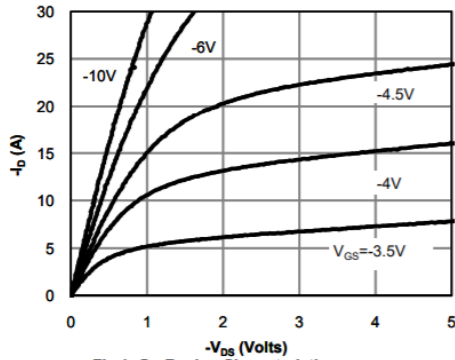


Figure 1: On-Region Characteristics

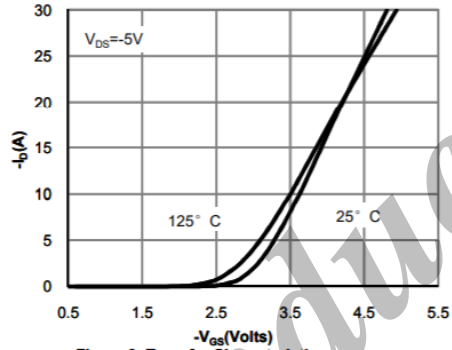


Figure 2: Transfer Characteristics

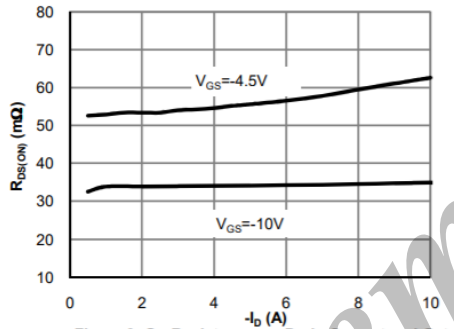


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

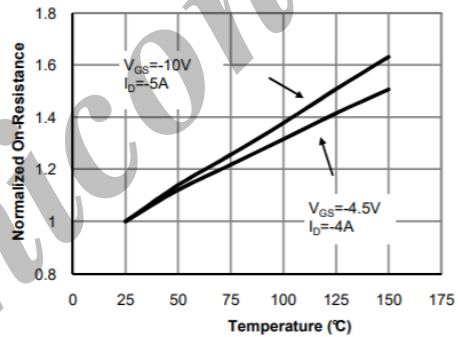


Figure 4: On-Resistance vs. Junction Temperature

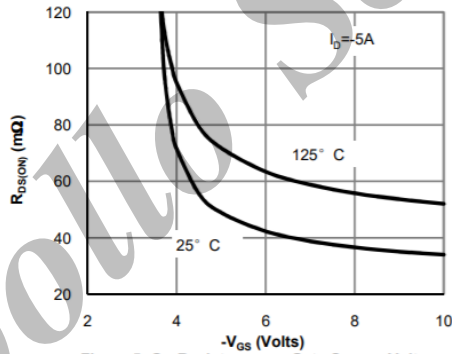


Figure 5: On-Resistance vs. Gate-Source Voltage

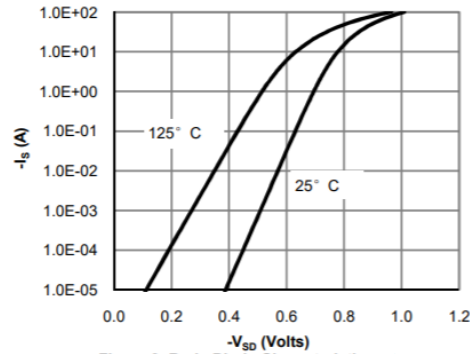


Figure 6: Body-Diode Characteristics

Note 1: The static characteristics in Figure 1 to 6 are obtained using <math><300\mu\text{A}</math> pulses, duty cycle 0.5% max.

• Typical Electrical and Thermal Characteristics

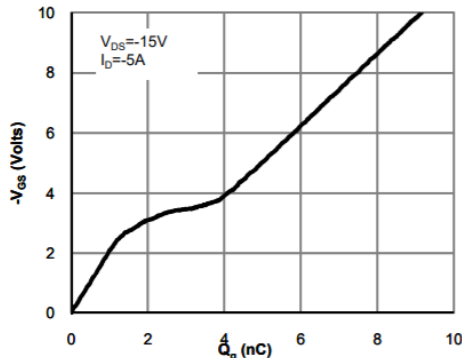


Figure 7: Gate-Charge Characteristics

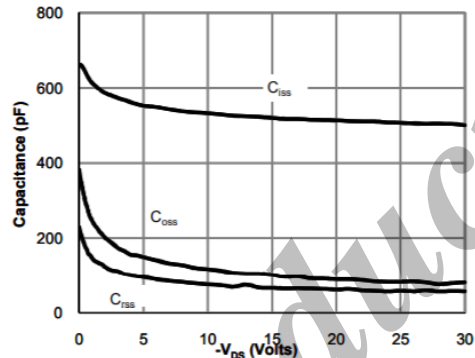


Figure 8: Capacitance Characteristics

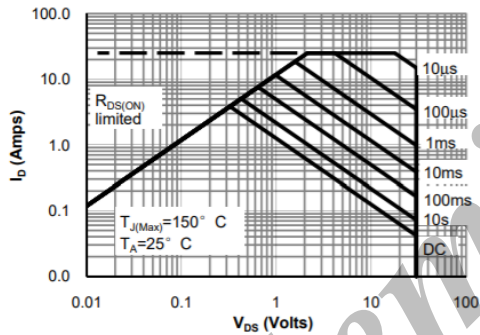


Figure 9: Maximum Forward Biased Safe Operating Area

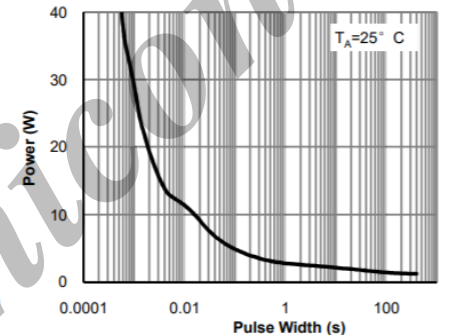


Figure 10: Single Pulse Power Rating Junction-to-Ambient

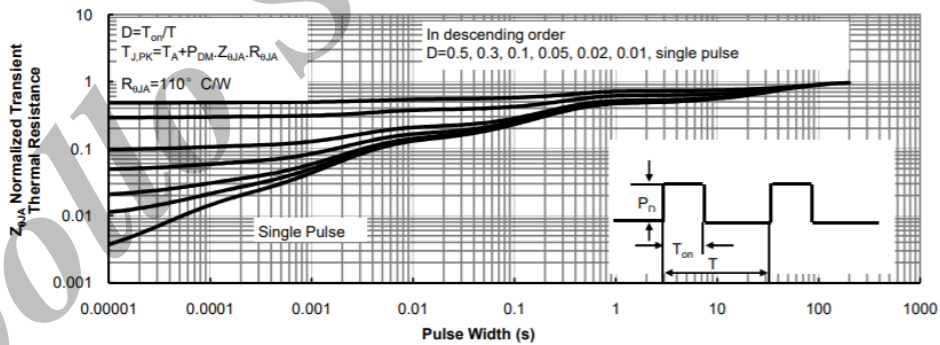


Figure 11: Normalized Maximum Transient Thermal Impedance

Note 2: The curves in Figure 9 to 11 are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with 2oz. copper, assuming a maximum junction temperature of $T_J(\text{MAX})=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

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