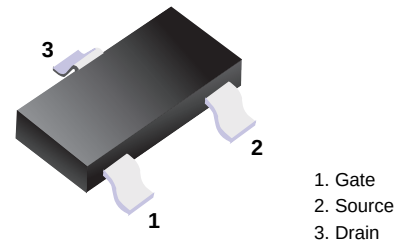


N-Channel MOSFET

■ Features

- 0.22 A, 25 V. $R_{DS(ON)} = 4 \Omega @ V_{GS} = 4.5 V$
 $R_{DS(ON)} = 5 \Omega @ V_{GS} = 2.7 V$.
- Very low level gate drive requirements allowing direct operation in 3V circuits. $V_{GS(th)} < 1.5V$.
- Gate-Source Zener for ESD ruggedness.
 $>6kV$ Human Body Model
- Replace multiple NPN digital transistors with one DMOSFET.



■ Simplified outline(SOT-23)

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage, Power Supply Voltage	V_{DS}, V_{CC}	25	V
Gate-Source Voltage, V_{IN}	V_{GS}, V_I	8	V
Drain/Output Current - Continuous	I_D	0.22	A
- pulse		0.5	A
Maximum Power Dissipation	P_D	0.35	W
Electrostatic Discharge Rating MIL-STD-883D Human Body Model (100pf / 1500 Ohm)	ESD	6	kV
Thermal Resistance, Junction-to- Ambient	$R_{\theta JA}$	357	$^\circ C/W$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ C$

■ Inverter Electrical Characteristics $T_A = 25^\circ C$ unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Zero Input Voltage Output Current	$I_O (off)$	$V_{CC} = 20 V, V_I = 0 V$			1.0	μA
Input Voltage	$V_I (off)$	$V_{CC} = 5 V, I_O = 10 \mu A$			0.5	V
	$V_I (on)$	$V_O = 0.3 V, I_O = 5 mA$	1.0			V
Output to Ground Resistance	$R_O (on)$	$V_I = 2.7 V, I_O = 0.2 A$			5.0	Ω

■ Electrical Characteristics Ta = 25°C unless otherwise noted

Parameter	Symbol	Testconditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{DSS}	V _{GS} = 0 V, I _D = 250 μA	25			V
Breakdown Voltage Temp. Coefficient	ΔV _{DSS} /ΔT _J	I _D = 250 μA, Referenced to 25 °C		25		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55°C			10	μA
Gate-Body Leakage Current, Forward	I _{GSSF}	V _{GS} = 8 V, V _{DS} = 0 V			100	nA
Gate-Body Leakage Current, Reverse	I _{GSSR}	V _{GS} = -8 V, V _{DS} = 0 V			-100	nA
Gate Threshold Voltage (Note)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.65	0.8	1.5	V
Gate Threshold Voltage Temp. Coefficient (Note)	ΔV _{GS(th)} /T _J	I _D = 250 μA, Referenced to 25 °C		-2.1		mV/°C
Static Drain-Source On-Resistance(Note)	R _{DS(on)}	V _{GS} = 4.5V, I _D = 0.4A			4.0	Ω
		V _{GS} = 2.7V, I _D = 0.2 A			5.0	
On-State Drain Current (Note)	I _{D(on)}	V _{GS} = 2.7 V, V _{DS} = 5 V	0.2			A
Forward Transconductance	g _{FS}	V _{DS} = 5V, I _D = 0.4 A		0.2		S
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1.0 MHz		9.5		pF
Output Capacitance	C _{oss}			6.0		
Reverse Transfer Capacitance	C _{rss}			1.3		
Turn-On Delay Time (Note)	t _{d(on)}	V _{DD} = 6V, I _D = 0.5A, V _{GS} = 4.5V, R _{GEN} = 50Ω		3.2	8	ns
Turn-On Rise Time (Note)	t _r			6	15	
Turn-Off Delay Time (Note)	t _{d(off)}			3.5	8	
Turn-Off Fall Time (Note)	t _f			3.5	8	
Total Gate Charge (Note)	Q _g	V _{DS} = 5 V, I _D = 0.2A, V _{GS} = 4.5V,		0.49	0.7	nC
Gate-Source Charge (Note)	Q _{gs}			0.22		
Gate-Drain Charge (Note)	Q _{gd}			0.07		
Maximum Continuous Drain-Source Diode Forward Current	I _S				0.29	A
Drain-Source Diode Forward Voltage(Note)	V _{SD}	V _{GS} = 0 V, I _S = 0.29 A			1.2	V

Note: Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.

■ Typical Characteristics

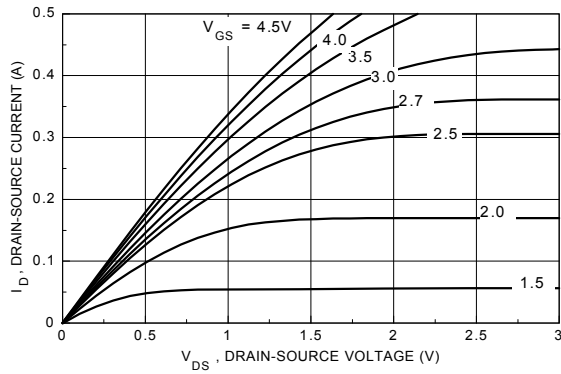


Figure 1. On-Region Characteristics.

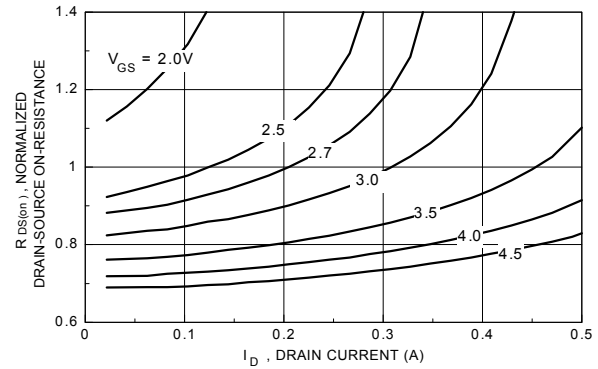


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

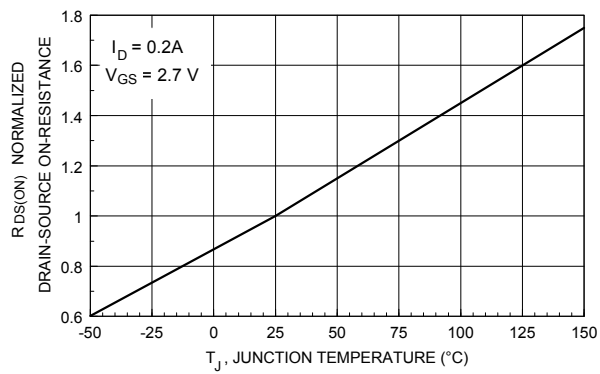


Figure 3. On-Resistance Variation with Temperature.

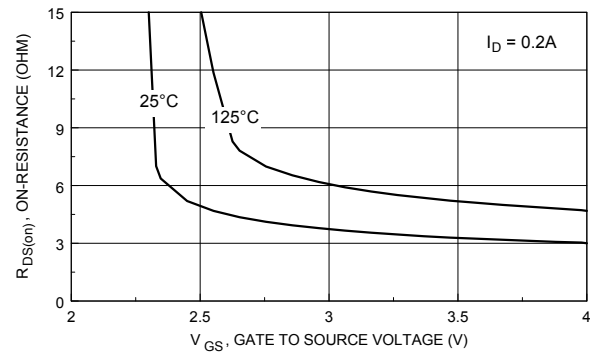


Figure 4. On-Resistance Variation with Gate-To-Source Voltage.

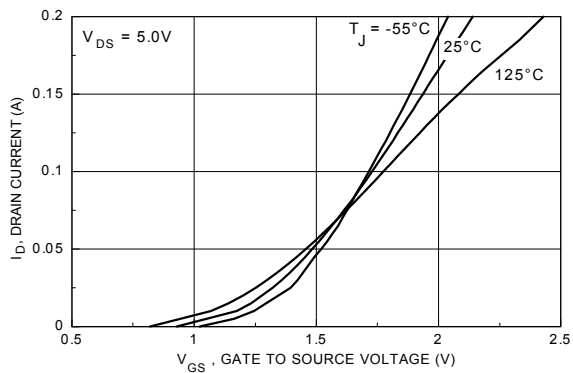


Figure 5. Transfer Characteristics.

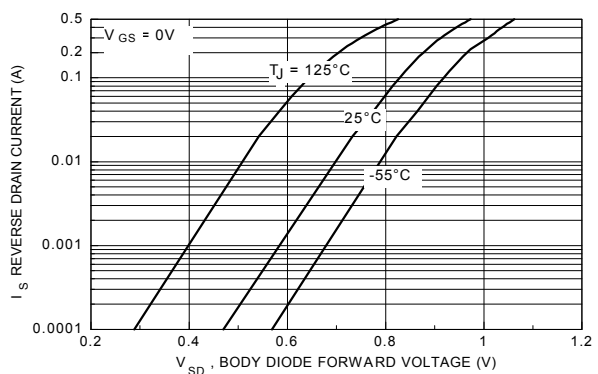


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

■ Typical Characteristics

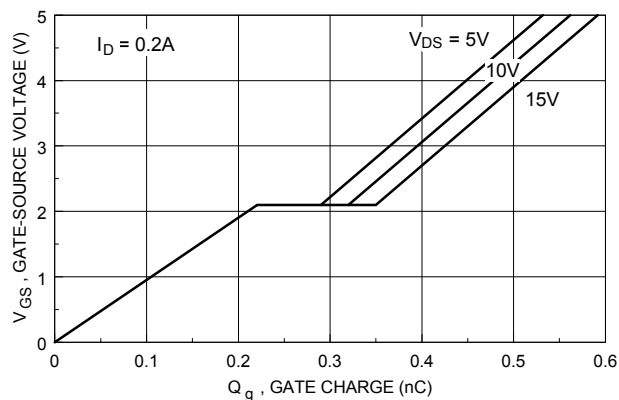


Figure 7. Gate Charge Characteristics.

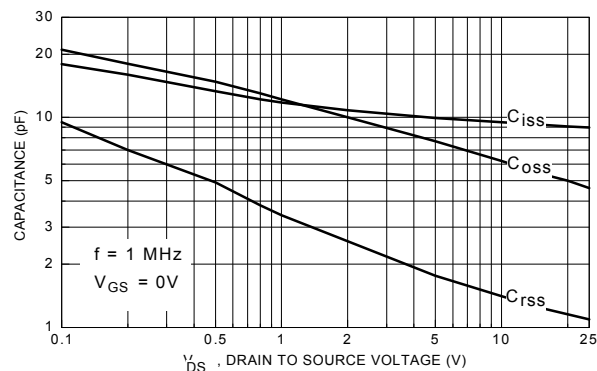


Figure 8. Capacitance Characteristics.

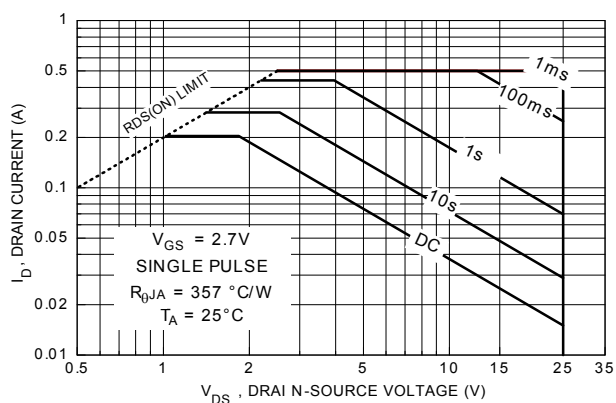


Figure 9. Maximum Safe Operating Area.

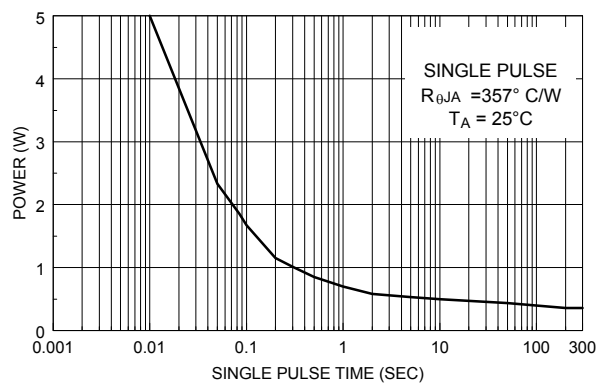


Figure 10. Single Pulse Maximum Power Dissipation.

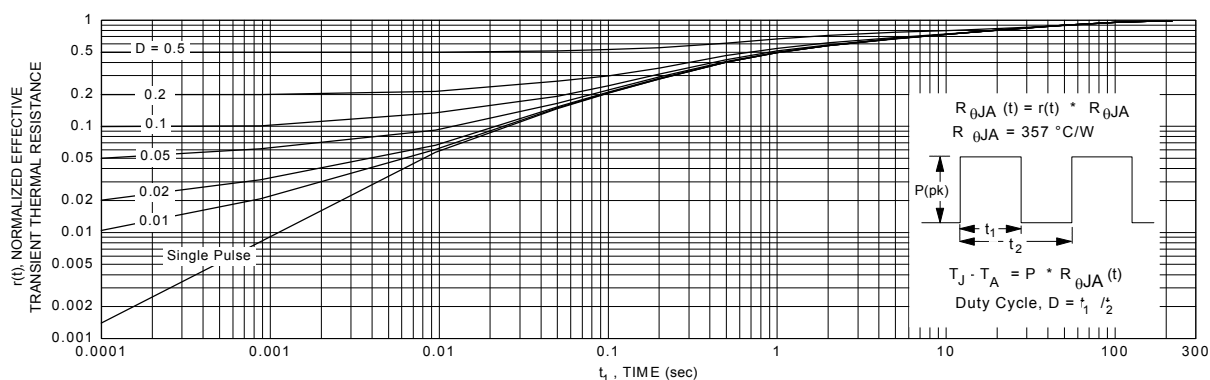
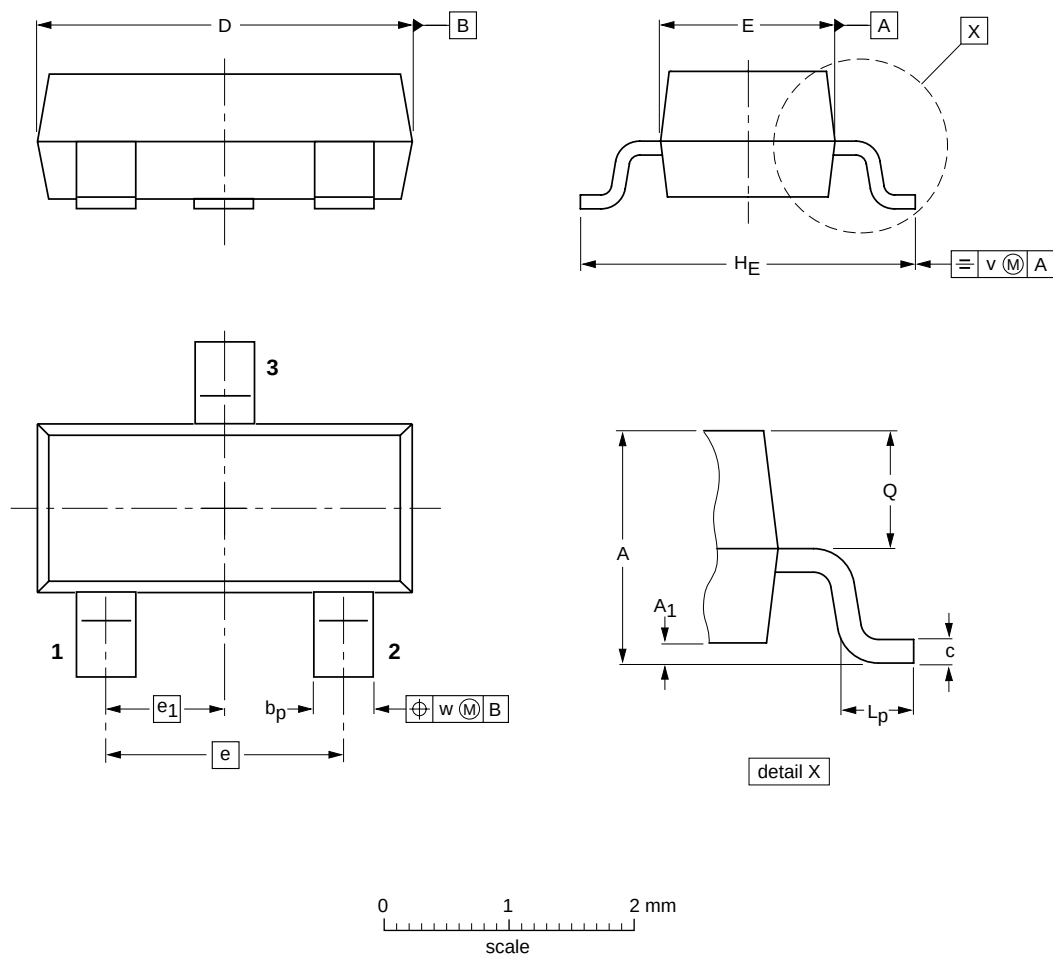


Figure 11. Transient Thermal Response Curve .

■ SOT-23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max.	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1