

N-Channel 60V MOSFET

Features:

- Surface-mounted package
- Halogen free
- Advanced trench cell design
- Extremely low threshold voltage
- ESD protected (HBM \geq 2KV)

$B_{V_{DSS}}=60V$,
 $R_{DS(ON)} \leq 3\Omega @ V_{GS}=10V$
 $R_{DS(ON)} \leq 4\Omega @ V_{GS}=4.5V$
 $I_D=0.43A$

Application

- Portable appliances

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	<p>Top View</p>	
2	Source(S)		
3	Drain(D)		

Absolute Maximum Ratings (TA=25°C Unless Otherwise Noted)

Parameter	Symbol	2N7002E	Unit
	Marking	E72	
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_D^{(1)}$	0.43	A
Pulsed Drain Current(1)	$I_{DM}^{(2)}$	1.7	A
Power Dissipation	P_D	Ta=25°C	0.83
		Ta=100°C	0.33
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	°C
Diode Forward Current	$I_S^{(1)}$	0.4	A

Thermal Characteristics

Symbol	Symbol	Typ.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	189	°C/W

Notes :

- (1) Surface Mounted on 1 in 2 pad area, $t \leq 10\text{sec}$
- (2) Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- (3) Unit mounted on glass-epoxy substrate with 1oz/ft² 1 x 1 mm copper pad per pin.

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Electrical Characteristics (TA =25°C Unless Otherwise Specified)

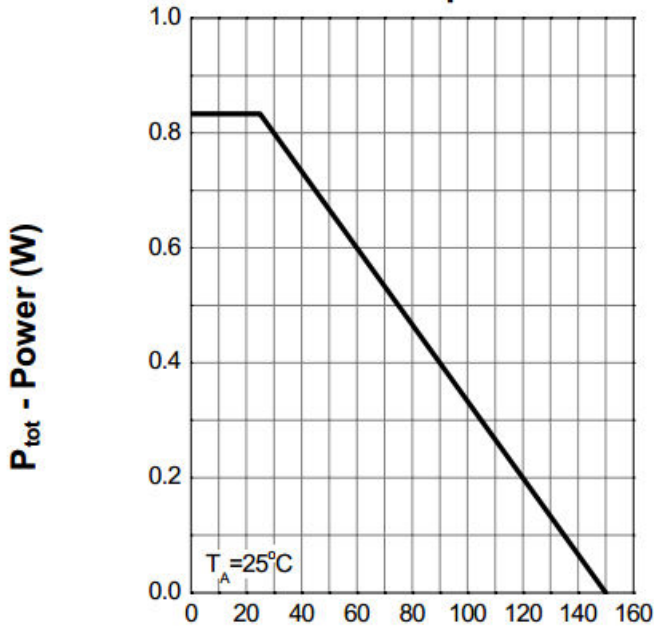
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static						
B _{VDSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	60	--	--	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.6	2.5	V
I _{GSS}	Gate-Body Leakage	V _{GS} =±20V	--	--	±10	μA
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V	--	--	1	μA
R _{DS(ON)}	Drain-Source On-Resistanc	V _{GS} =10 V, I _D =0.4A	--	1.9	3.0	Ω
		V _{GS} =4.5 V, I _D =0.3A	--	2.0	4.0	Ω
Dynamic						
R _G	Gate resistance	V _{GS} = V _{DS} = 0V, f =1.0MHz	--	130	--	Ω
Q _g	Total Gate Charge	V _{DS} =10V, I _D =0.4A, V _{GS} =4.5V	--	0.71	--	pC
Q _{gs}	Gate-Source Charge		--	0.6	--	
Q _{gd}	Gate-Drain Charge		--	0.16	--	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f =1.0MHz	--	30	--	pF
C _{oss}	Output Capacitance		--	4.2	--	
C _{rss}	Reverse Transfer Capacitance		--	4	--	
t _{d(on)}	Turn-On Delay Time	V _{DS} =30V, I _D =0.2A, R _G =25Ω, V _{GEN} = 10V, R _L =150Ω	--	2	--	nS
t _r	Turn-On Rise Time		--	22	--	
t _{d(off)}	Turn-Off Delay Time		--	10	--	
t _f	Turn-Off Fall Time		--	22	--	
Source-Drain Diode Ratings and Characteristics						
V _{SD} (¹)	Diode Forward voltage	I _{SD} =0.4A, V _{GS} =0V	--	0.7	1.3	V
T _{rr}	Reverse Recovery Time	I _{SD} =0.4A,	--	40	--	nS
Q _{rr}	Reverse Recovery Charge	dI / dt = 100A/μS	--	40	--	μC

Notes :

(1) Pulse test : pulse width ≤ 300us, duty cycle ≤ 2%

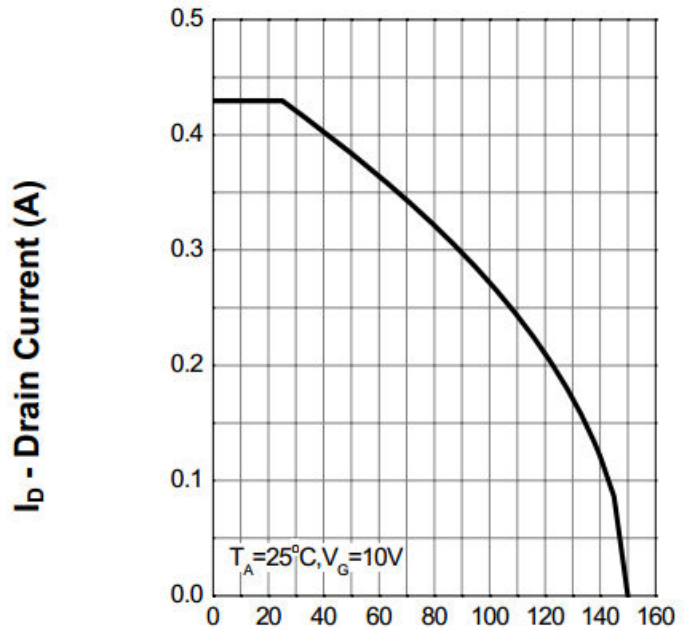
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Power Dissipation



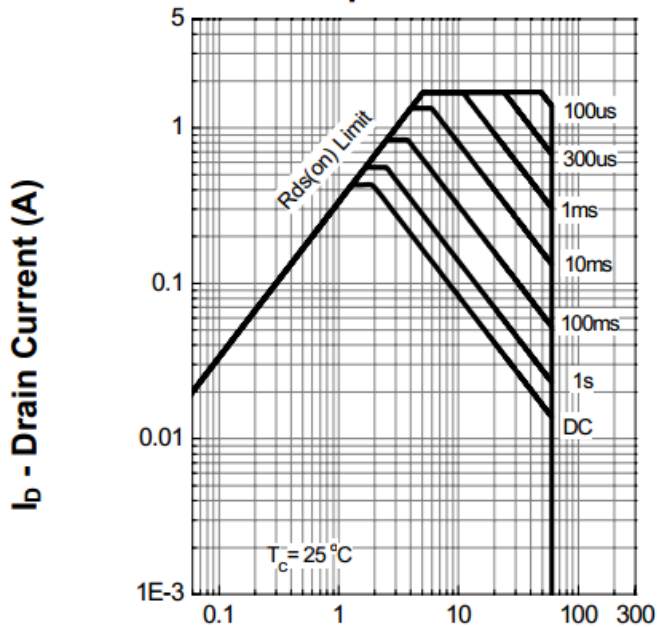
T_j - Junction Temperature ($^\circ\text{C}$)

Drain Current



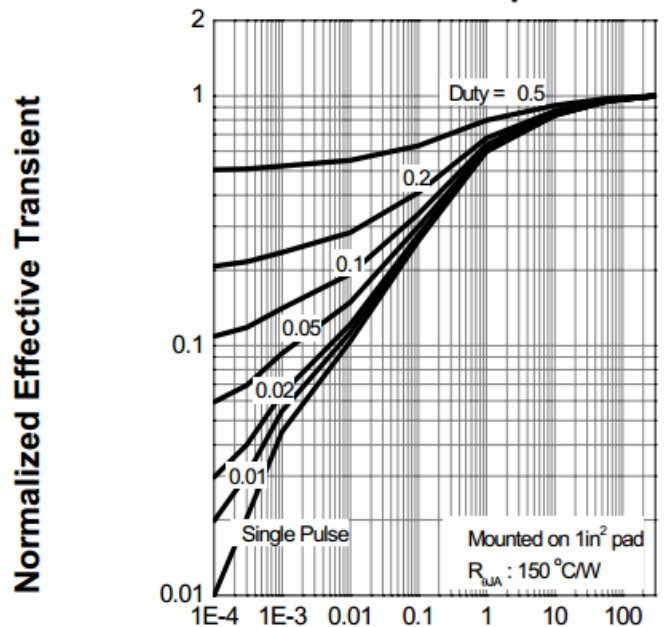
T_j - Junction Temperature ($^\circ\text{C}$)

Safe Operation Area



V_{DS} - Drain-Source Voltage (V)

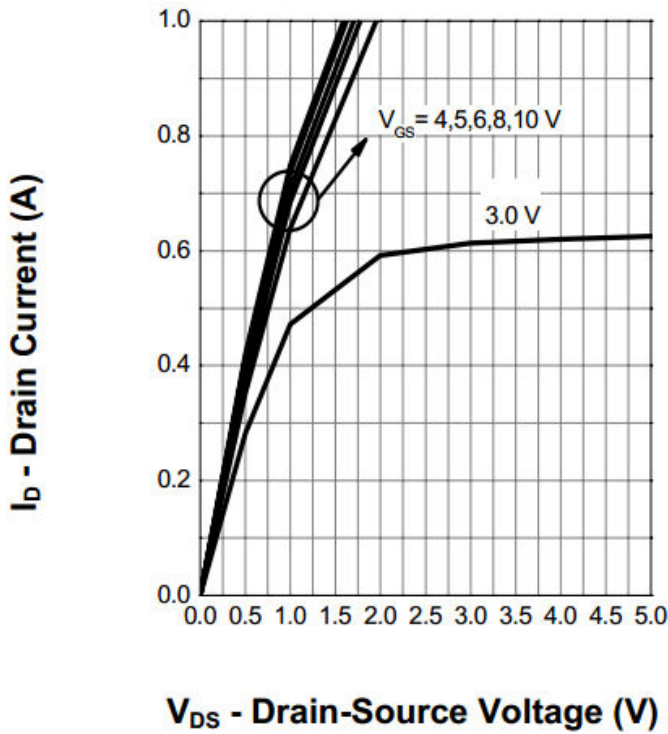
Thermal Transient Impedance



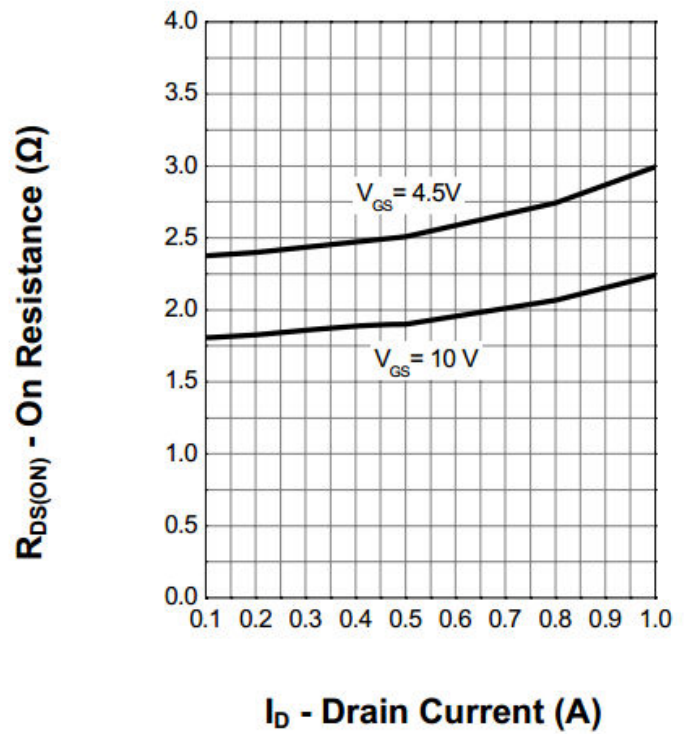
Square Wave Pulse Duration (sec)

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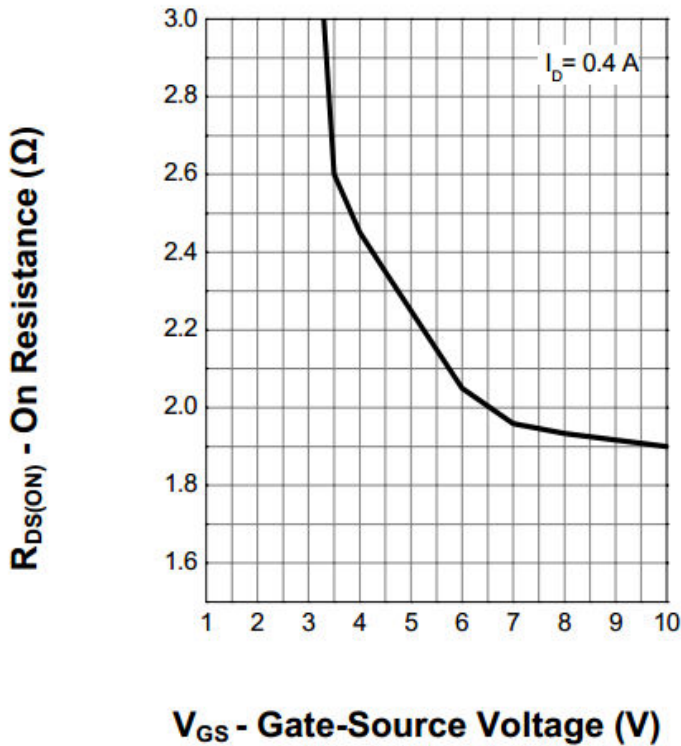
Output Characteristics



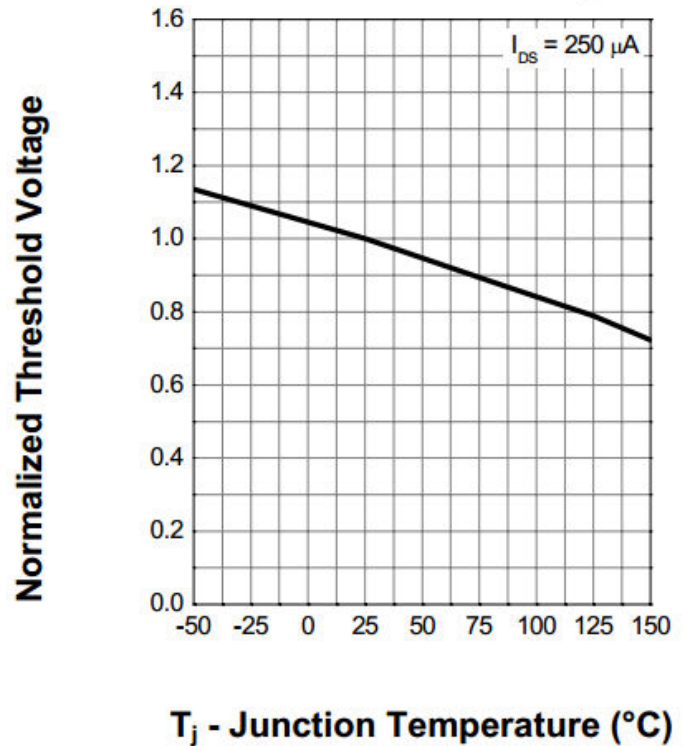
Drain-Source On Resistance



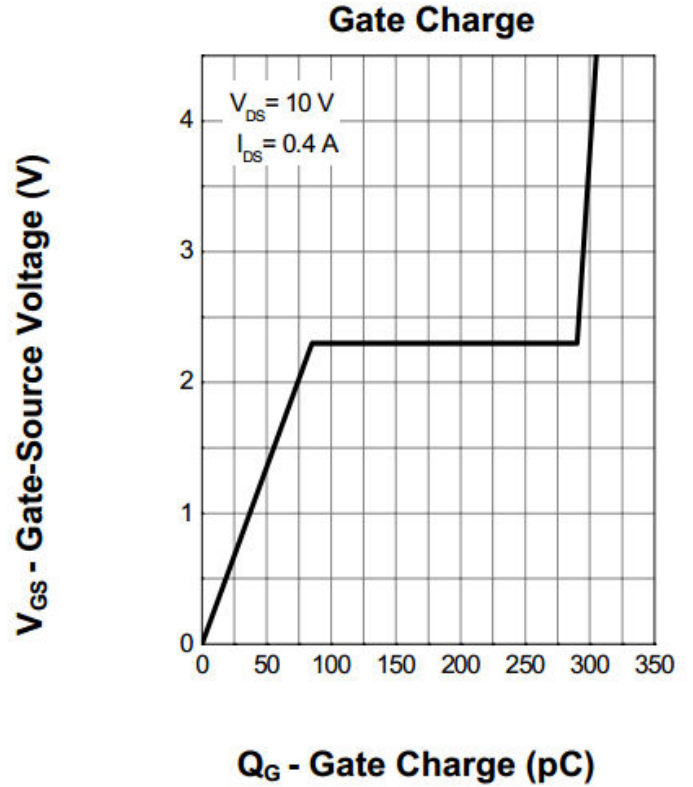
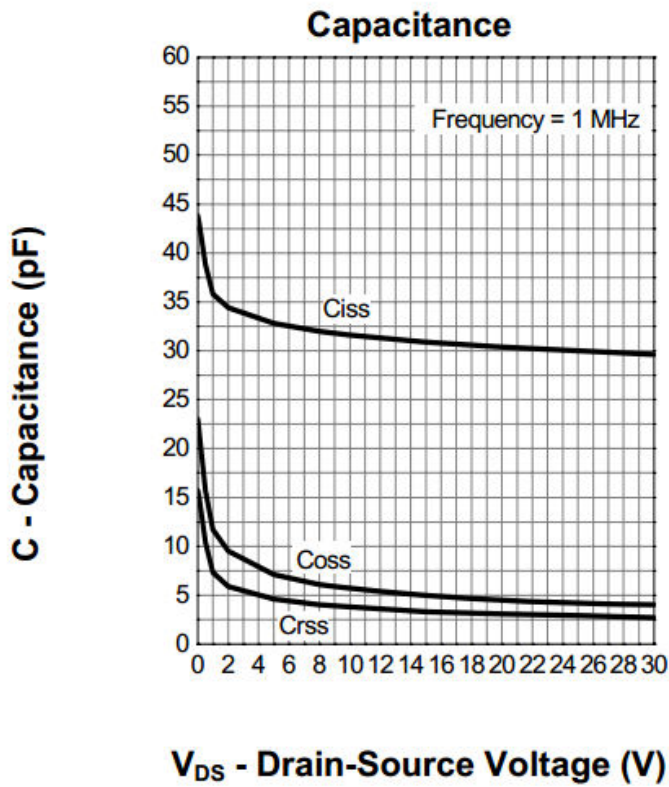
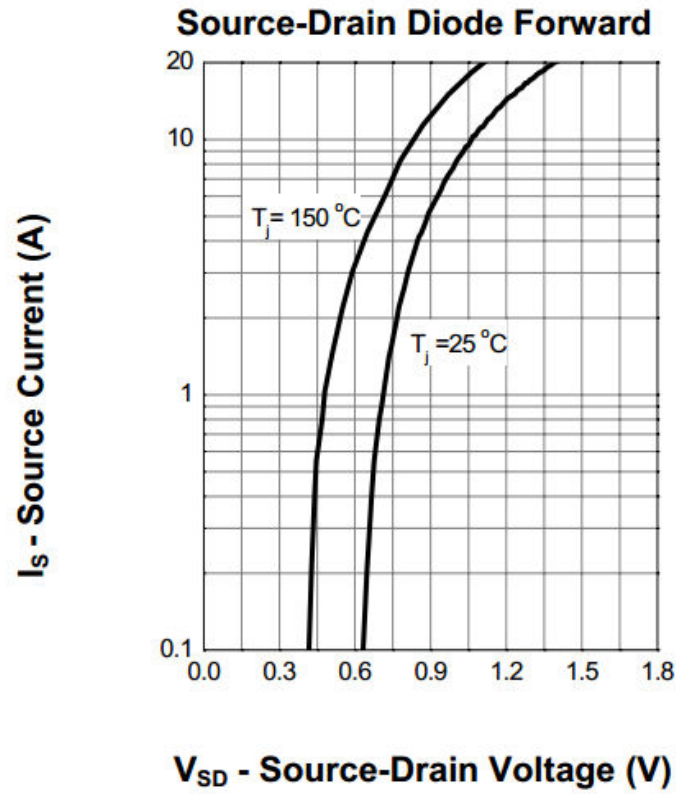
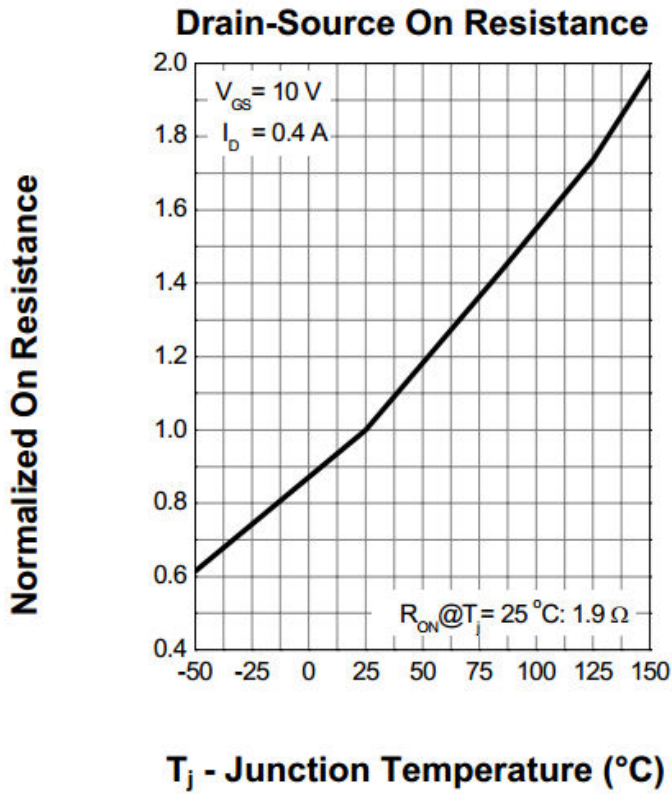
Transfer Characteristics



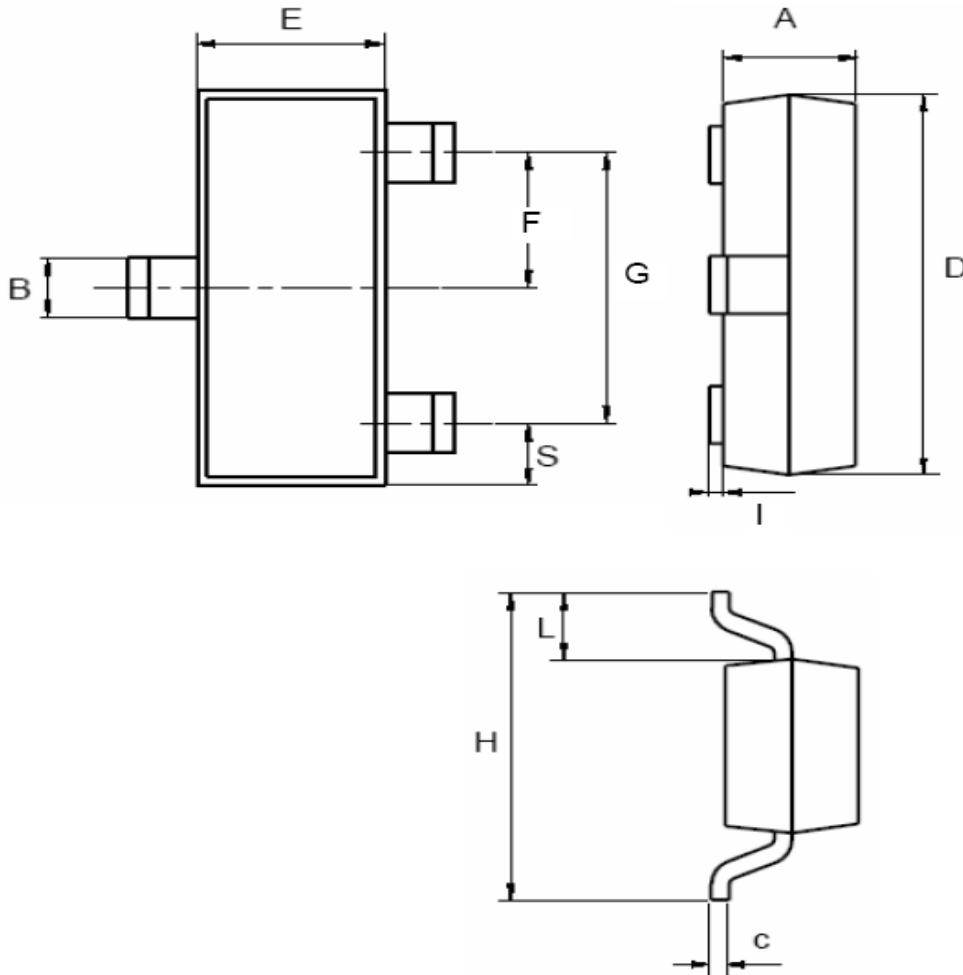
Gate Threshold Voltage



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SOT-23		
DIM.	MIN.	MAX.
A	0.89	1.20
B	0.30	0.51
C	0.085	0.18
D	2.75	3.04
E	1.20	1.60
F	0.85	1.05
G	1.70	2.10
H	2.10	2.75
I	0.0	0.1
L	0.60 typ.	
S	0.35	0.65
All Dimensions in millimeter		

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