

DP1013KT

DP1013KT P-Channel Enhancement Mode Field Effect Transistor

General description

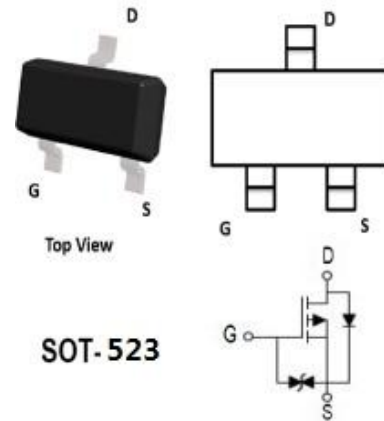
P-Channel Enhancement Mode Field Effect Transistor

Features:

- $V_{DS} : -20V$
- $I_D : -0.65A$
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) < 450 mohm
- $R_{DS(ON)}$ (at $V_{GS}=-2.5V$) < 600 mohm

Applications

- Power Management in Note book
- Portable Equipment
- Battery Powered System



Device Marking Code:

Device Type	Device Marking
DP1013KT	39K

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Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 10	V
I_D	Drain Current – Continuous ($T_A=25^\circ C$)	-650	mA
	Drain Current – Continuous ($T_A=70^\circ C$)	-320	mA
I_{DM}	Drain Current – Pulsed ¹	-1.6	A
P_D	Power Dissipation ($T_A=25^\circ C$)	312	mW
	Power Dissipation – Derate above 25°C	2.5	mW/°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	400	°C/W

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Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to $25\text{ }^\circ\text{C}$, $I_D=-1\text{mA}$	---	-0.01	---	V/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25\text{ }^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-16V, V_{GS}=0V, T_J=125\text{ }^\circ\text{C}$	---	---	-10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	± 20	μA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-0.5A$	---	350	450	m
		$V_{GS}=-2.5V, I_D=-0.3A$	---	450	600	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.4	-0.65	-1.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	mV/ $^\circ\text{C}$

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-0.2A$	---	1		nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	0.28		
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	0.18		
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DD}=-10V, V_{GS}=-4.5V,$ $R_G=10\ \Omega, I_D=-0.2A$	---	8		ns
T_r	Rise Time ^{2, 3}		---	5.2		
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	30		
T_f	Fall Time ^{2, 3}		---	18		
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, F=1\text{MHz}$	---	40		pF
C_{oss}	Output Capacitance		---	15		
C_{rss}	Reverse Transfer Capacitance		---	6.5		

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-0.65	A
I_{SM}	Pulsed Source Current		---	---	-1.3	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-0.2A, T_J=25\text{ }^\circ\text{C}$	---	---	-1.3	V

Notes:

- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- Essentially independent of operating temperature.

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Typical Performance Characteristics

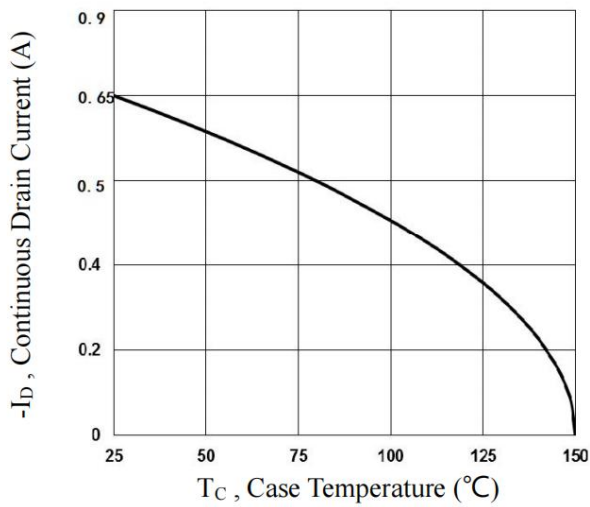


Fig.1 Continuous Drain Current vs. T_c

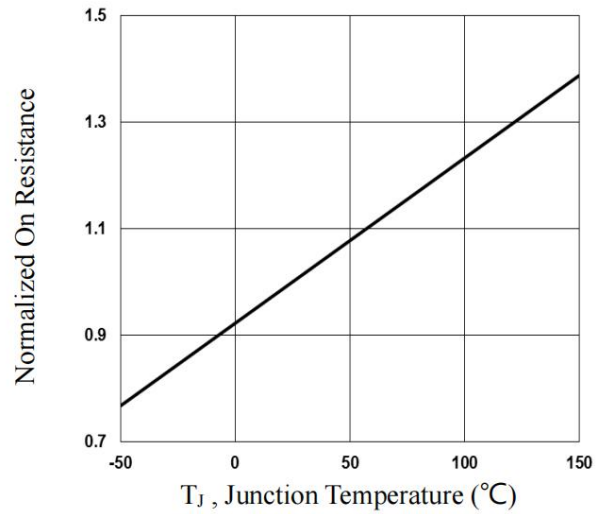


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

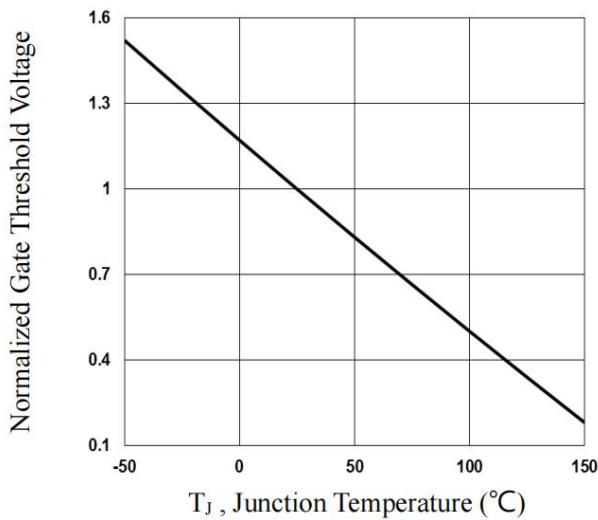


Fig.3 Normalized V_{th} vs. T_j

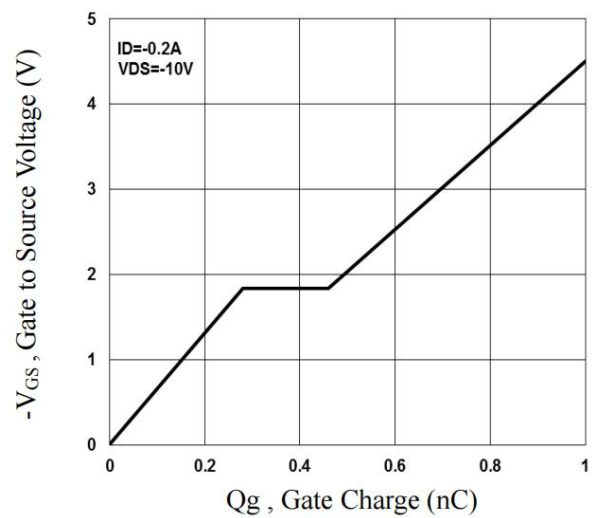


Fig.4 Gate Charge Waveform

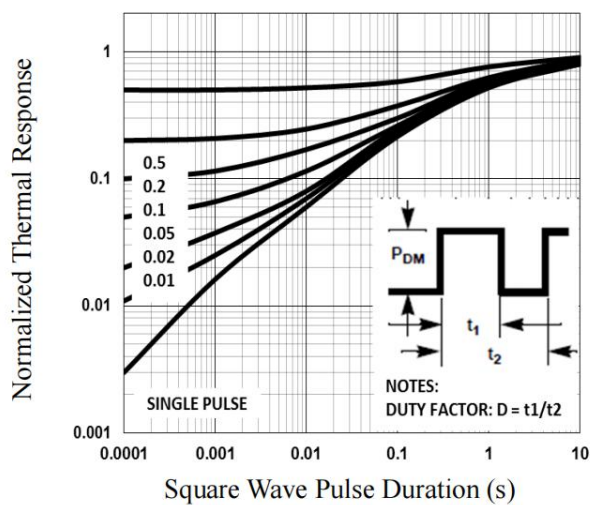


Fig.5 Normalized Transient Response

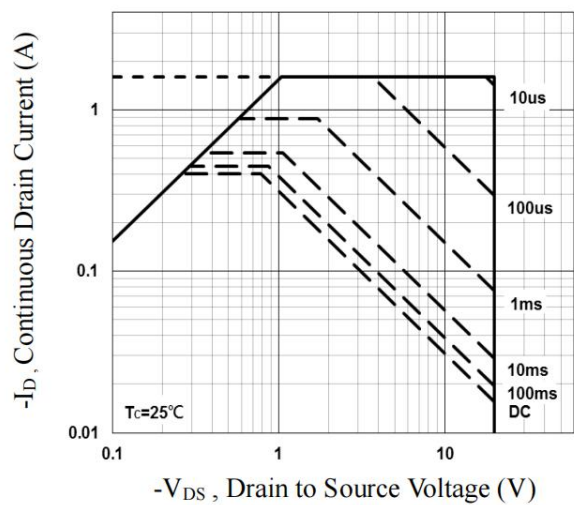


Fig.6 Maximum Safe Operation Area

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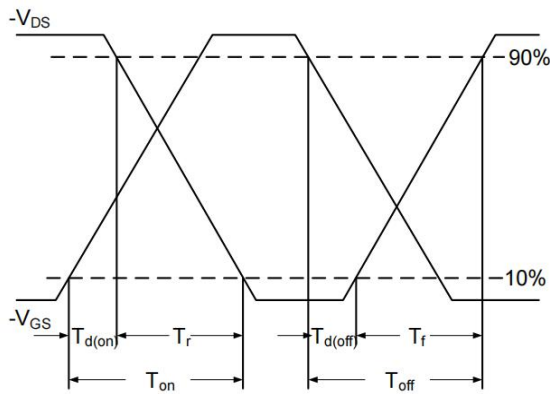


Fig.7 Switching Time Waveform

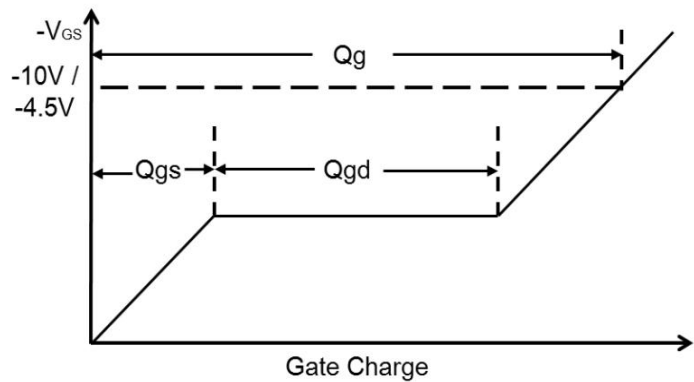
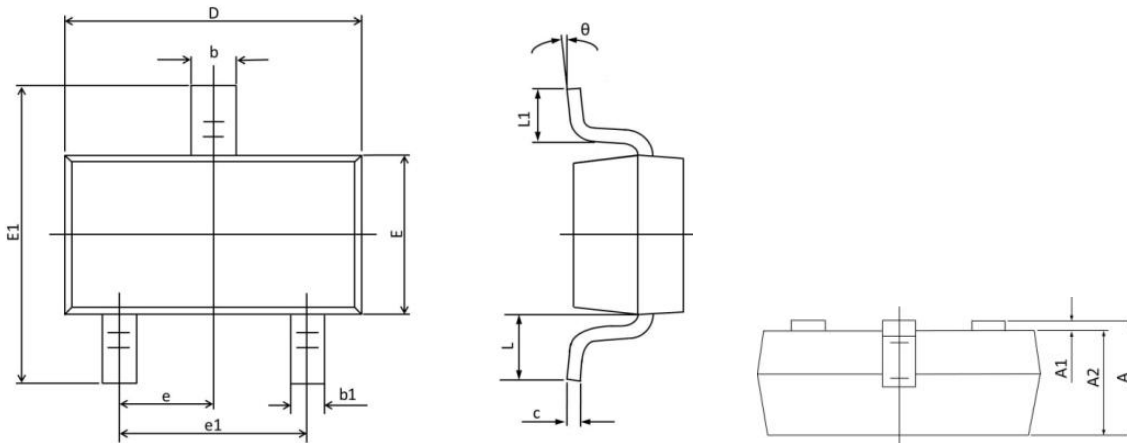


Fig.8 Gate Charge Waveform

SOT-523 Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
A1	0.100	0.000	0.004	0.000
A2	0.800	0.700	0.031	0.028
b	0.350	0.250	0.014	0.010
b1	0.250	0.150	0.010	0.006
c	0.200	0.100	0.008	0.004
D	1.750	1.500	0.069	0.059
E	0.900	0.700	0.035	0.028
E1	1.750	1.400	0.069	0.055
e	0.5TYP.		0.02TYP.	
e1	1.100	0.900	0.043	0.035
L	0.460	0.300	0.018	0.012
L1	0.460	0.260	0.018	0.010
θ	8°	0°	8°	0°

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