Ordering number : ENA0686

SANYO Semiconductors

DATA SHEET

N-Channel Silicon MOSFET

2SK3978 — General-Purpose Switching Device Applications

Features

- Low ON-resistance.
- Ultrahigh-speed switching.
- 4V drive

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V_{DSS}		200	V
Gate-to-Source Voltage	V_{GSS}		±20	V
Drain Current (DC)	I_D		4	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	16	A
Allowable Power Dissipation	P_D		1	W
		Tc=25°C	20	W
Channel Temperature	Tch		150	°C
Storage Temperature	Tstg		−55 to +150	°C

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=1mA, V_{GS}=0V	200			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=200V, V_{GS}=0V			1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±16V, V_{DS}=0V			±10	μA
Cutoff Voltage	$V_{GS}(off)$	V_{DS}=10V, I_D=1mA	1.2		2.6	V
Forward Transfer Admittance	$\|yfs\|$	V_{DS}=10V, I_D=2A	3.2	5.3		S
Static Drain-to-Source On-State Resistance	$R_{DS}(on)1$	I_D=2A, V_{GS}=10V		420	550	mΩ
	$R_{DS}(on)2$	I_D=2A, V_{GS}=4V		450	640	mΩ

Marking: K3978

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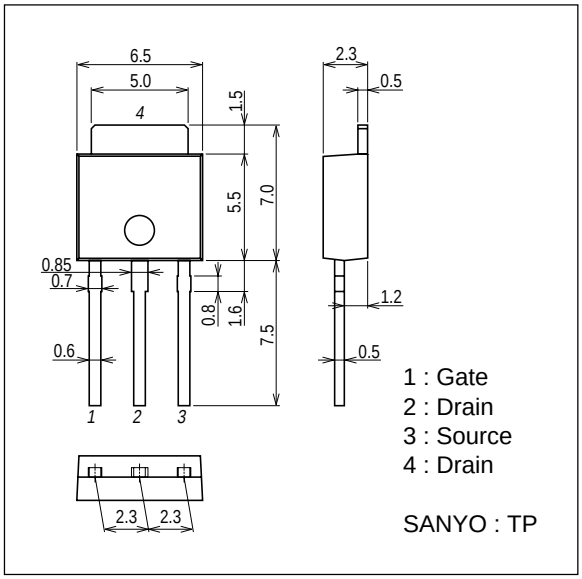
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input Capacitance	Ciss	V_{DS}=20V, f=1MHz		950		pF
Output Capacitance	Coss	V_{DS}=20V, f=1MHz		44		pF
Reverse Transfer Capacitance	Crss	V_{DS}=20V, f=1MHz		26		pF
Turn-ON Delay Time	t_{d}(on)	See specified Test Circuit.		12.2		ns
Rise Time	t_{r}	See specified Test Circuit.		8.4		ns
Turn-OFF Delay Time	t_{d}(off)	See specified Test Circuit.		96		ns
Fall Time	t_{f}	See specified Test Circuit.		32		ns
Total Gate Charge	Qg	V_{DS}=100V, V_{GS}=10V, I_{D}=4A		21		nC
Gate-to-Source Charge	Qgs	V_{DS}=100V, V_{GS}=10V, I_{D}=4A		2.8		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=100V, V_{GS}=10V, I_{D}=4A		4.7		nC
Diode Forward Voltage	V_{SD}	I_{S}=4A, V_{GS}=0V		0.88	1.2	V

Package Dimensions

unit : mm (typ)

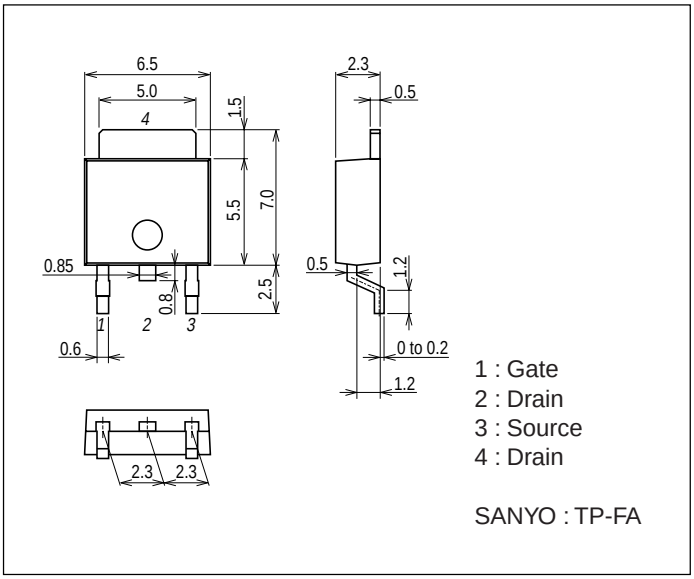
7518-004



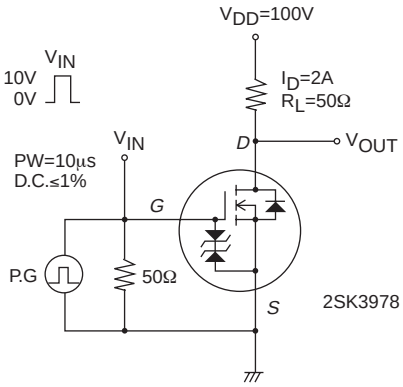
Package Dimensions

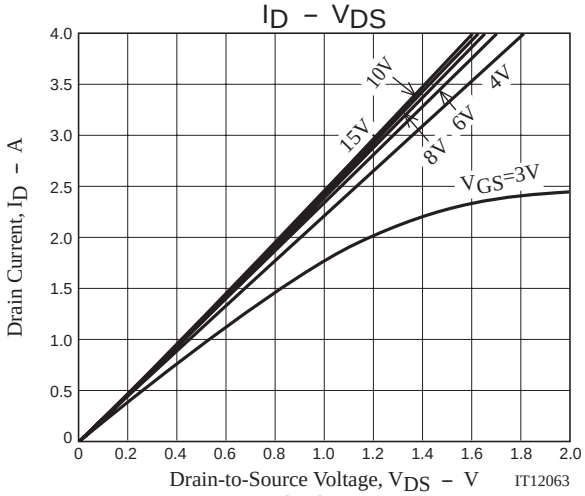
unit : mm (typ)

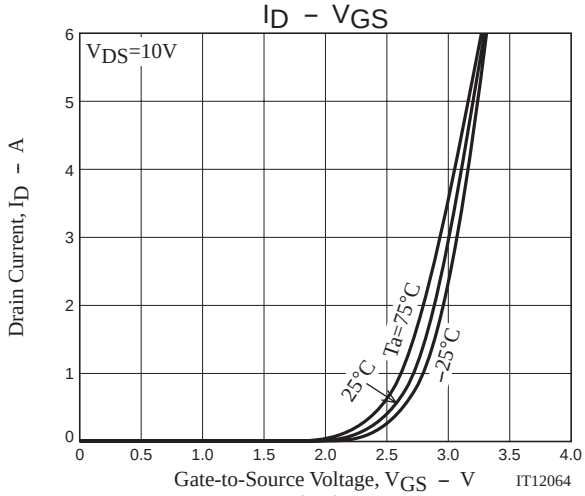
7003-004

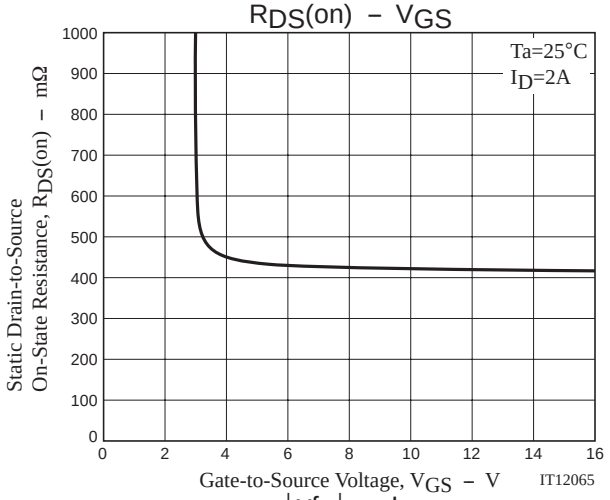


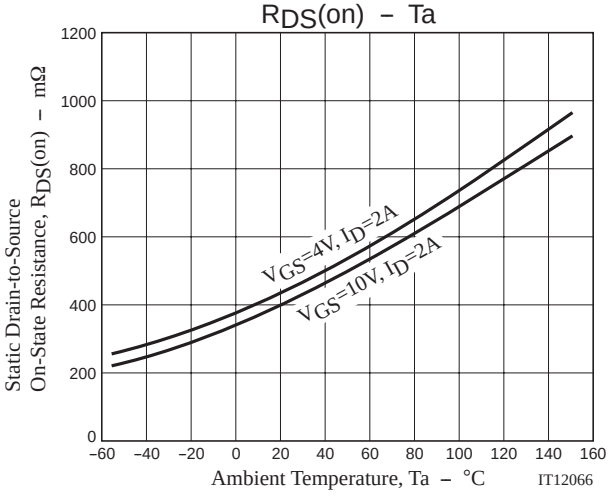
Switching Time Test Circuit

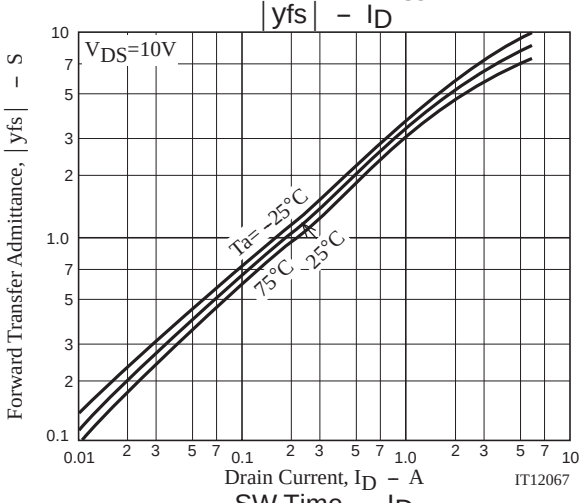


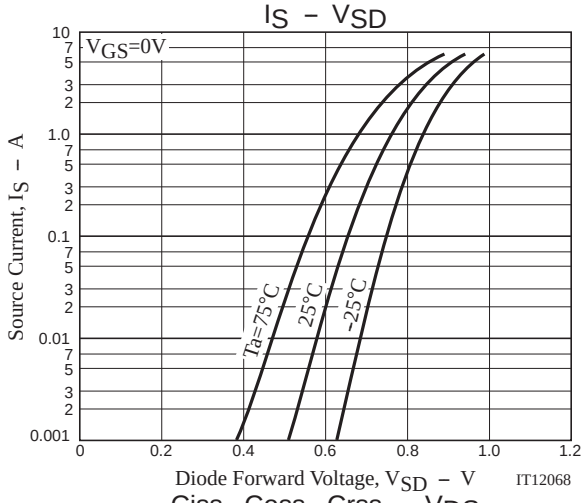

ID – VDS
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT12063
10V
15V
8V
6V
4V
VGS=3V

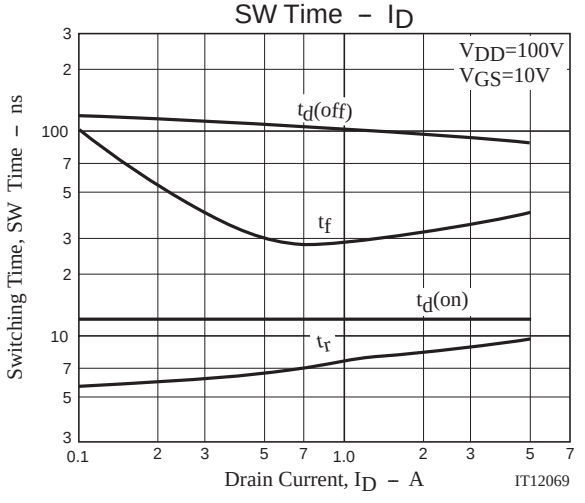

ID – VGS
VDS=10V
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT12064
Ta=75°C
25°C
–25°C

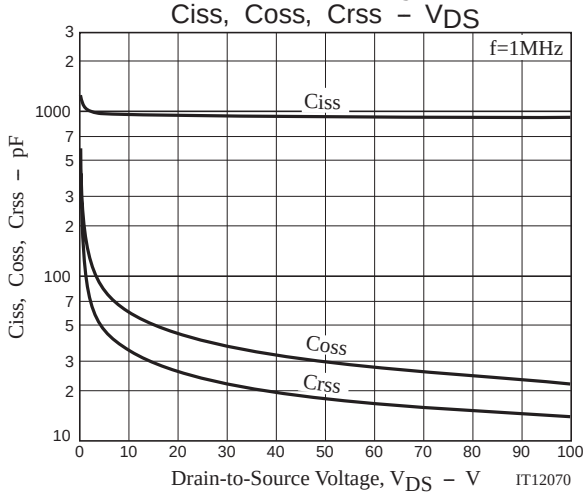

RDS(on) – VGS
Ta=25°C
ID=2A
Static Drain-to-Source
On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT12065

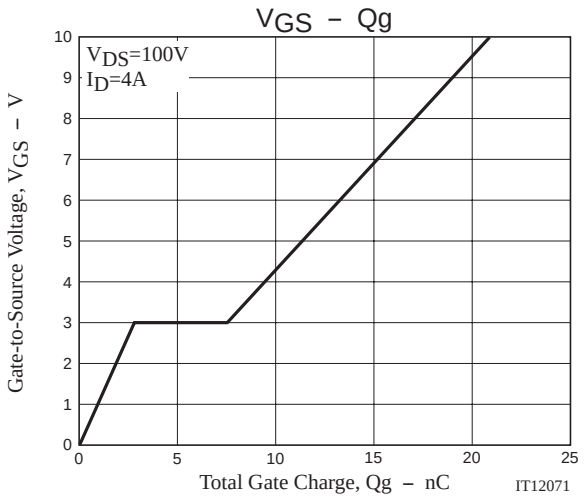

RDS(on) – Ta
VGS=4V, ID=2A
VGS=10V, ID=2A
Static Drain-to-Source
On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT12066

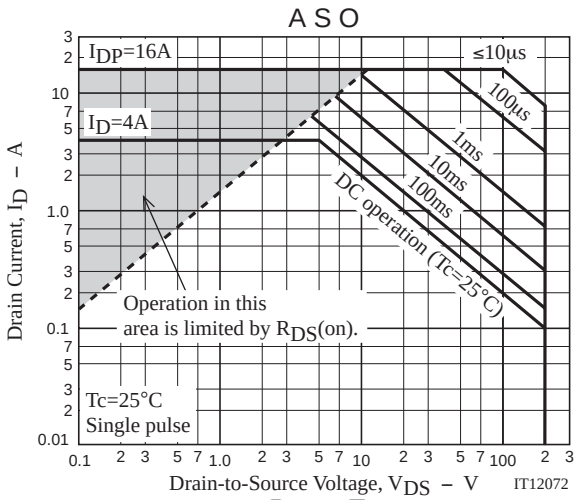

|yfs| – ID
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT12067

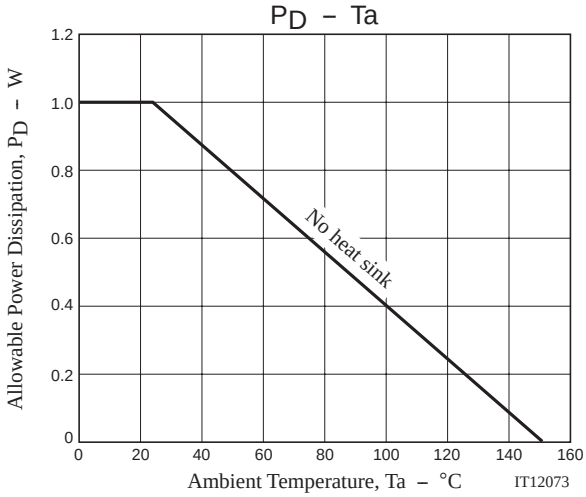

IS – VSD
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT12068

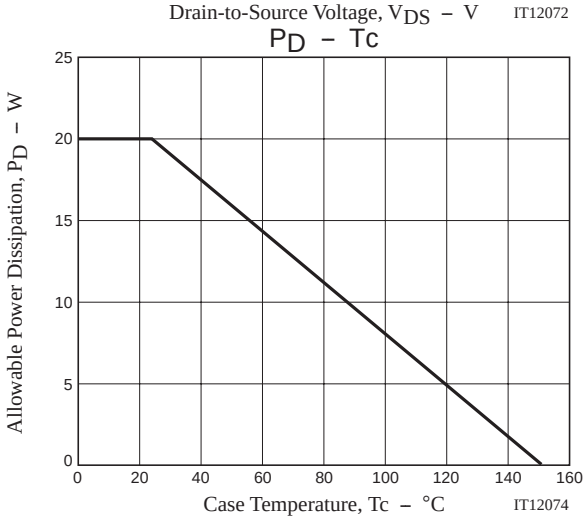

SW Time – ID
VDD=100V
VGS=10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT12069


Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT12070









Note on usage : Since the 2SK3978 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.