Ordering number : ENA0391

SANYO Semiconductors

DATA SHEET

N-Channel Silicon MOSFET

2SK3977 — General-Purpose Switching Device Applications

Features

- Low ON-resistance.
- Ultrahigh-speed switching.
- 4.5V drive

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	V_{DSS}		100	V
Gate-to-Source Voltage	V_{GSS}		±20	V
Drain Current (DC)	I_D		10	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	40	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	100			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V, 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=6A	6	10		S
Static Drain-to-Source On-State Resistance	$R_{DS}(on)1$	I_D=6A, V_{GS}=10V		70	92	mΩ
	$R_{DS}(on)2$	I_D=6A, V_{GS}=4.5V		85	120	mΩ
Input Capacitance	Ciss	V_{DS}=20V, f=1MHz		1560		pF
Output Capacitance	Coss	V_{DS}=20V, f=1MHz		130		pF
Reverse Transfer Capacitance	Crss	V_{DS}=20V, f=1MHz		83		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit.		16		ns
Rise Time	t_r	See specified Test Circuit.		55		ns
Turn-OFF Delay Time	$t_d(off)$	See specified Test Circuit.		120		ns
Fall Time	t_f	See specified Test Circuit.		80		ns

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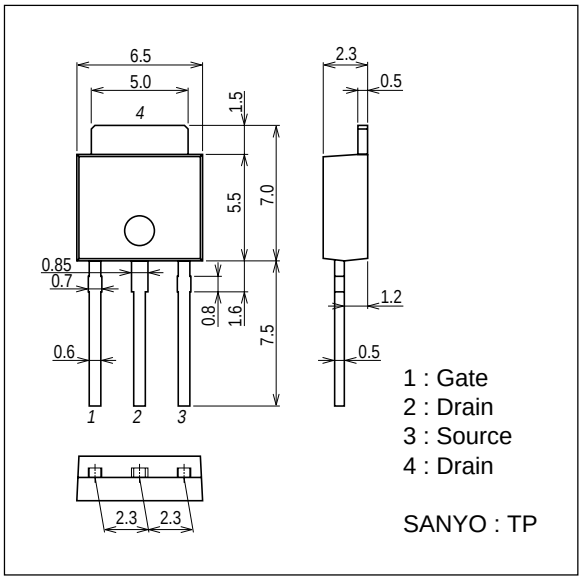
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Total Gate Charge	Qg	V_{DS}=50V, V_{GS}=10V, I_D=10A		34		nC
Gate-to-Source Charge	Qgs	V_{DS}=50V, V_{GS}=10V, I_D=10A		5.5		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=50V, V_{GS}=10V, I_D=10A		6		nC
Diode Forward Voltage	V_{SD}	I_S=10A, V_{GS}=0V		0.95	1.2	V

Package Dimensions

unit : mm (typ)

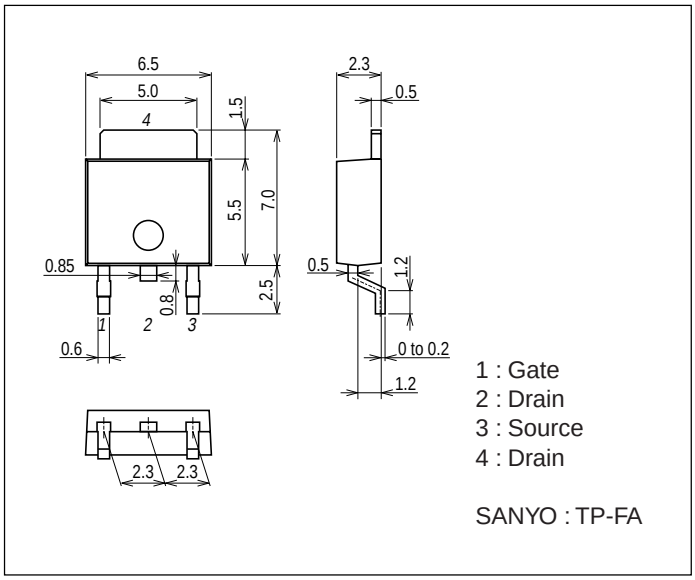
7518-004



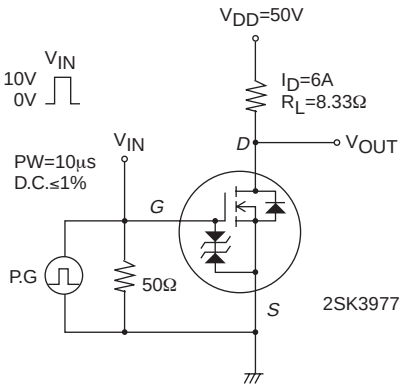
Package Dimensions

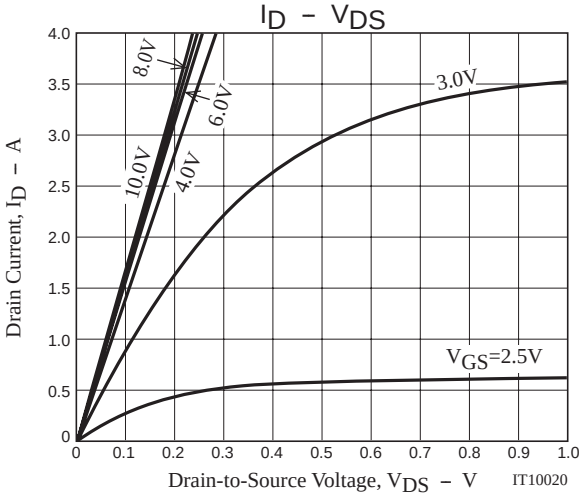
unit : mm (typ)

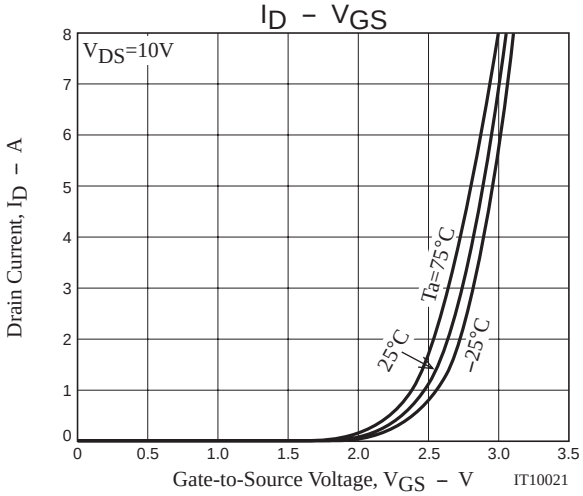
7003-004

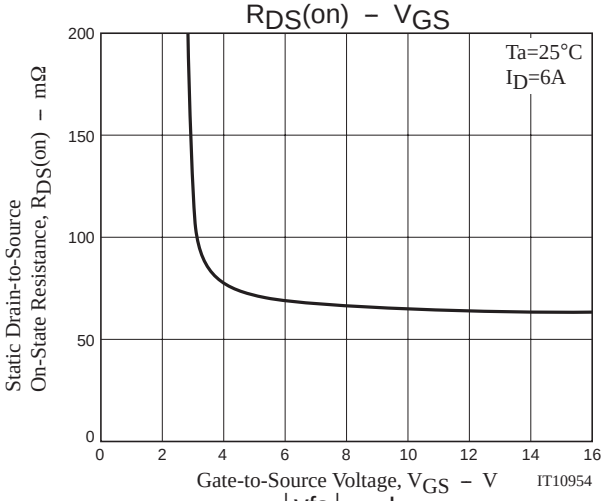


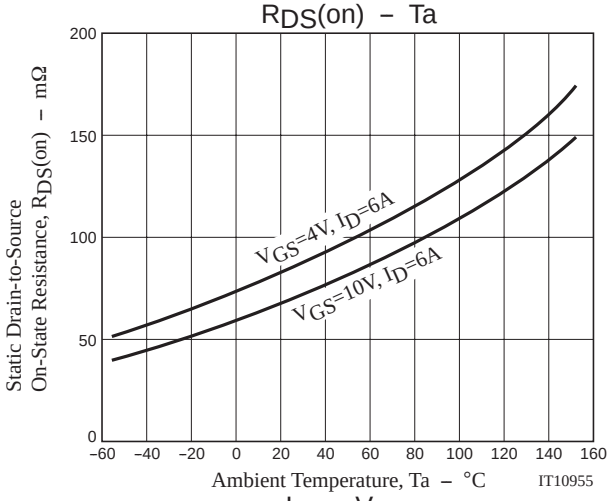
Switching Time Test Circuit

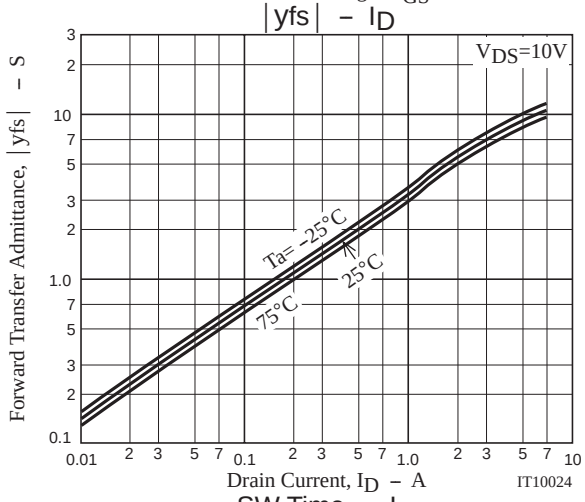


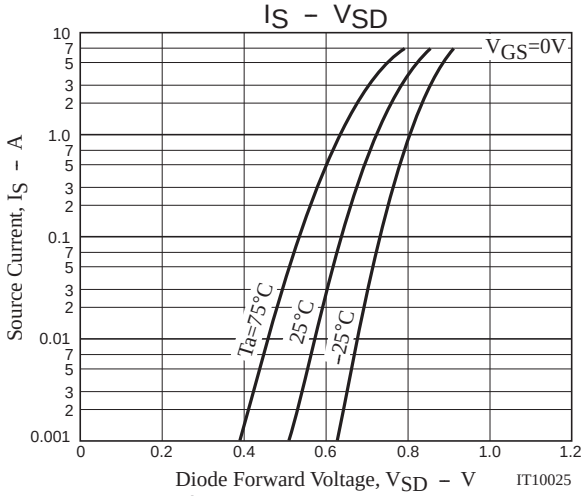


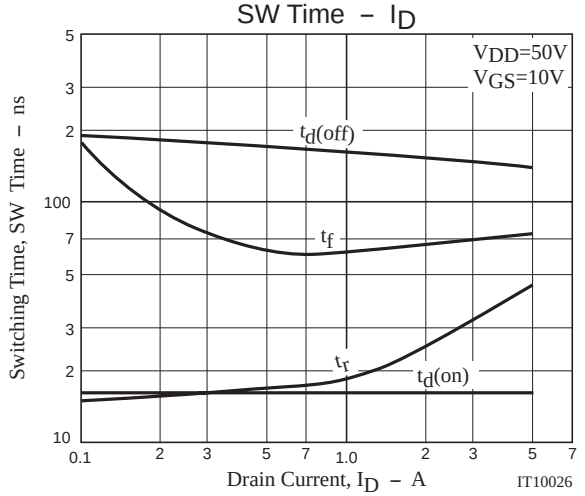


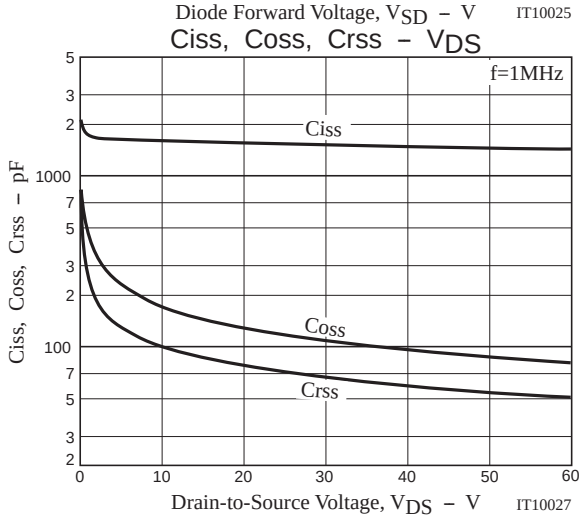

RDS(on) – VGS
Ta=25°C
ID=6A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT10954

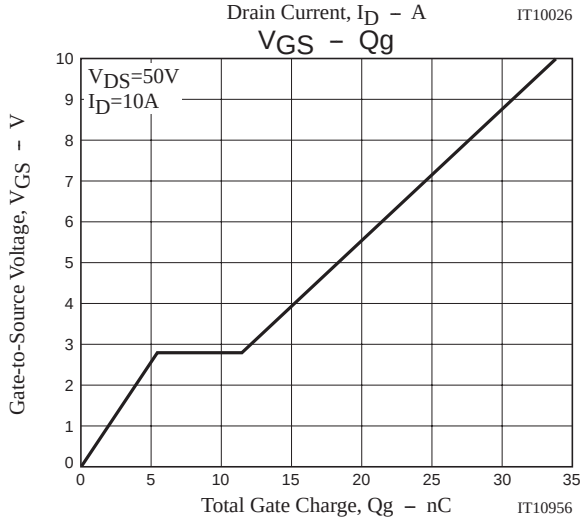

RDS(on) – Ta
VGS=4V, ID=6A
VGS=10V, ID=6A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT10955

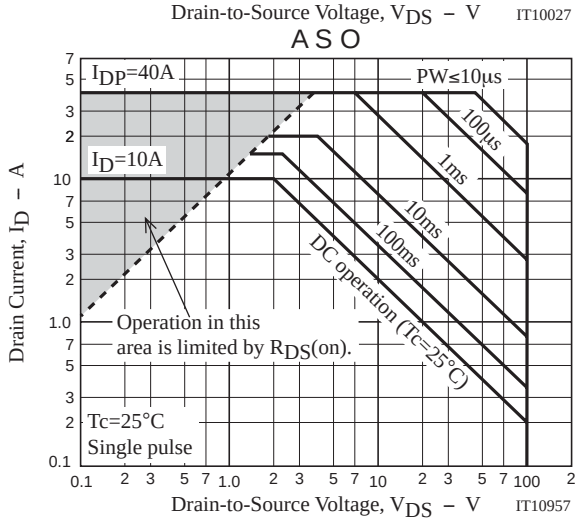

|yfs| – ID
VDS=10V
Ta=–25°C
25°C
75°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT10024

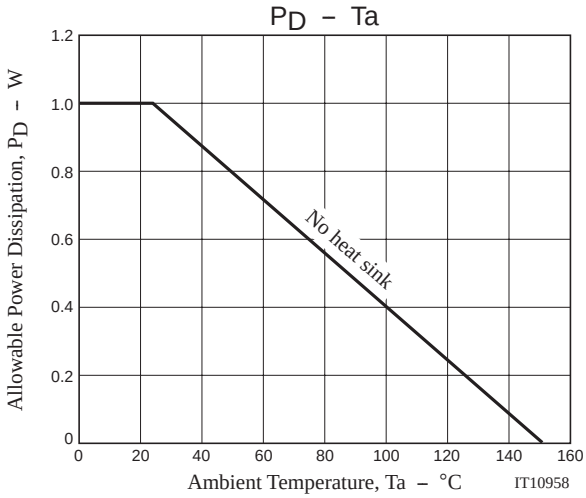

IS – VSD
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT10025

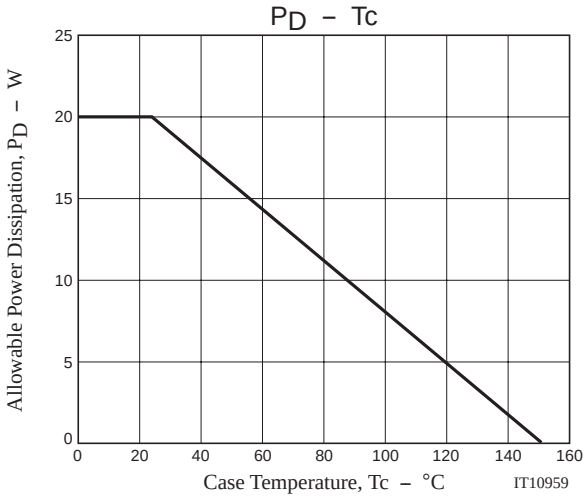

SW Time – ID
VDD=50V
VGS=10V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT10026


Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT10027


VGS – Qg
VDS=50V
ID=10A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT10956


ASO
IDP=40A
PW≤10μs
ID=10A
100μs
1ms
10ms
100ms
DC operation (Tc=25°C)
Operation in this area is limited by RDS(on).
Tc=25°C
Single pulse
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT10957





Note on usage : Since the 2SK3977 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.