Yixin

P-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 40	0.0162 at V_{GS} = - 10 V	- 36	67
	0.0230 at V_{GS} = - 4.5 V	- 24	

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

APPLICATIONS

- Power Switch
- Load Switch in High Current Applications
- DC/DC Converters

TO-252
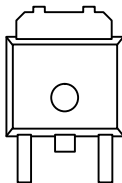
Drain Connected to Tab

G   D   S

Top View

Ordering Information:
SUD45P04-16P-GE3 (Lead (Pb)-free and Halogen-free)
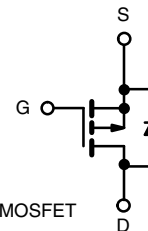
P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 36	A
	T_C = 70 °C		- 29	
Pulsed Drain Current (t = 300 µs)		I_{DM}	- 100	
Avalanche Current		I_{AS}	- 32	
Single Avalanche Energy[a]	L = 0.1 mH	E_{AS}	51	mJ
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	41.7[b]	W
	T_A = 25 °C[c]		2.1	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount)[c]	R_{thJA}	60	°C/W
Junction-to-Case (Drain)	R_{thJC}	3	

Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR-4 material).

SUD45P04-16P

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 0 V, I_D = - 250 µA	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1		- 2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 40 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 40 V, V_{GS} = 0 V, T_J = 125 °C			- 50	
		V_{DS} = - 40 V, V_{GS} = 0 V, T_J = 150 °C			- 250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≤ - 10 V, V_{GS} = - 10 V	- 50			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 14 A		0.0135	0.0162	Ω
		V_{GS} = - 4.5 V, I_D = - 12 A		0.0190	0.0230	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 20 V, I_D = - 14 A		40		S
Dynamic[b]						
Input Capacitance	C_{iss}			2765		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V, V_{DS} = - 20 V, f = 1 MHz		330		
Reverse Transfer Capacitance	C_{rss}			280		
Total Gate Charge[c]	Q_g			67	100	nC
Gate-Source Charge[c]	Q_{gs}	V_{DS} = - 20 V, V_{GS} = - 10 V, I_D = - 14 A		13.5		
Gate-Drain Charge[c]	Q_{gd}			14		
Gate Resistance	R_g	f = 1 MHz	0.5	2.5	5	Ω
Turn-On Delay Time[c]	$t_{d(on)}$			10	20	ns
Rise Time[c]	t_r	V_{DD} = - 20 V, R_L = 2 Ω		11	20	
Turn-Off Delay Time[c]	$t_{d(off)}$	I_D ≅ - 10 A, V_{GEN} = - 10 V, R_g = 1 Ω		42	63	
Fall Time[c]	t_f			12	20	
Drain-Source Body Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				- 36	A
Pulsed Current	I_{SM}				- 100	
Forward Voltage[a]	V_{SD}	I_F = - 10 A, V_{GS} = 0 V		- 0.8	- 1.5	V
Reverse Recovery Time	t_{rr}			38	57	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$	I_F = - 10 A, dI/dt = 100 A/µs		2.3	3.5	A
Reverse Recovery Charge	Q_{rr}			40	60	nC

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
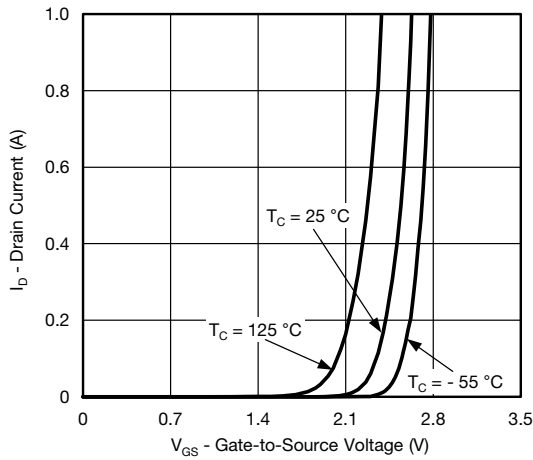
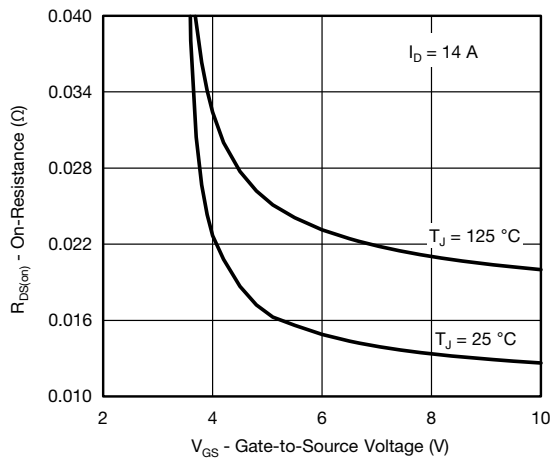## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
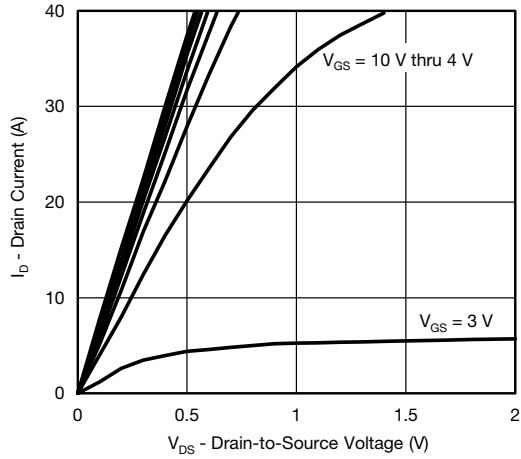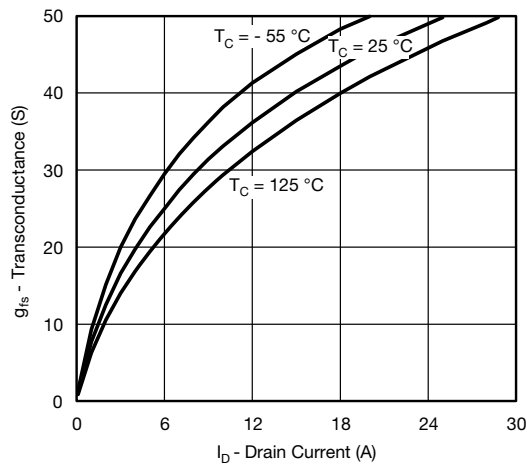
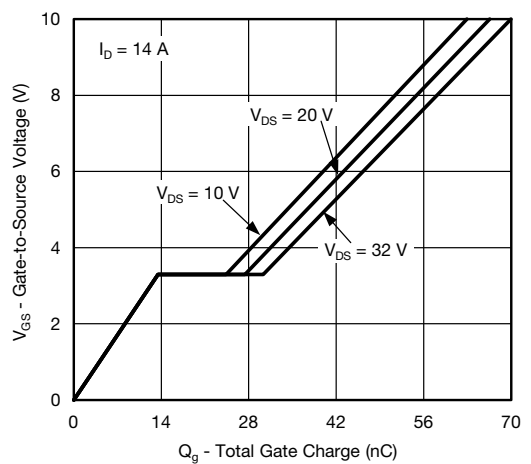**Output Characteristics**
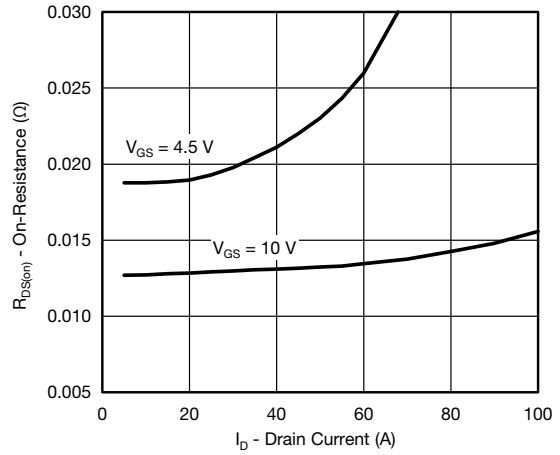
On-Resistance vs. Drain Current

Transfer Characteristics

On-Resistance vs. Gate-to-Source Voltage

Transconductance

Gate Charge