

P-Channel 40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

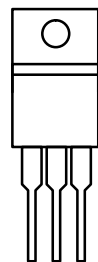
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)
- 40	0.015 at V _{GS} = - 10 V	- 65
	0.023 at V _{GS} = - 4.5 V	- 50

FEATURES

- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT

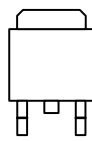


Top View

SUP65P04-15

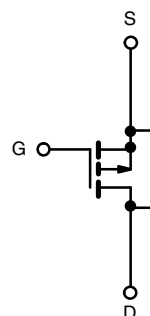
DRAIN connected to TAB

TO-263



Top View

SUB65P04-15



P-Channel MOSFET

Ordering Information: SUP65P04-15-E3 (Lead (Pb)-free)

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 = 175 °C)	I _D	T _C = 25 °C - 65	A
		T _C = 125 °C - 37	
Pulsed Drain Current	I _{DM}	- 240	
Avalanche Current	I _{AR}	- 60	
Repetitive Avalanche Energy ^a	E _{AR}	L = 0.1 mH 180	mJ
Power Dissipation	P _D	T _C = 25 °C (TO-220AB and TO-263) 120 ^c	W
		T _A = 25 °C (TO-263) ^b 3.75	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount (TO-263) ^b	R _{thJA}	40	°C/W
	Free Air (TO-220AB)	R _{thJA}	62.5	
Junction-to-Case		R _{thJC}	1.25	

Notes:

a. Duty cycle ≤ 1 %.

b. When mounted on 1" square PCB (FR-4 material).

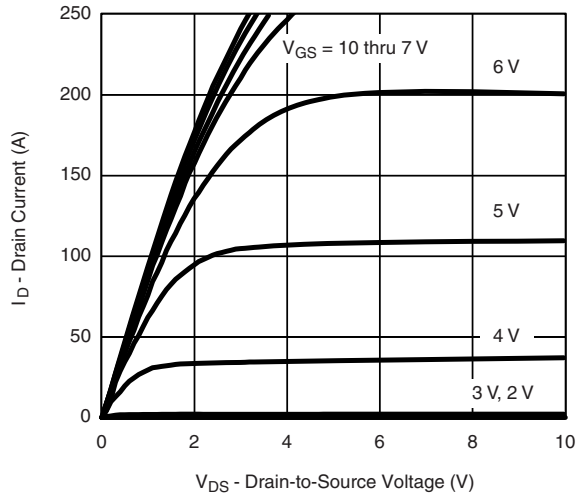
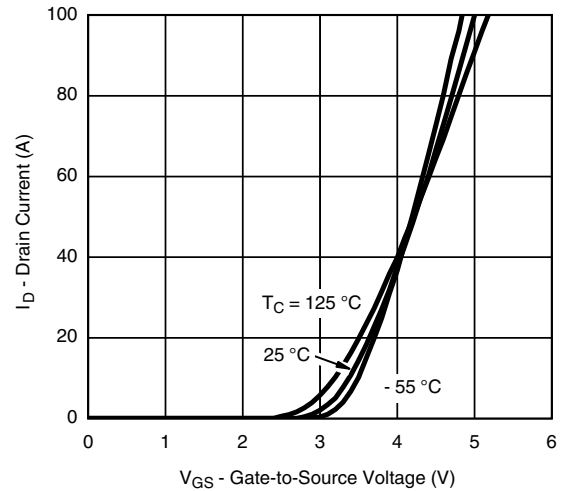
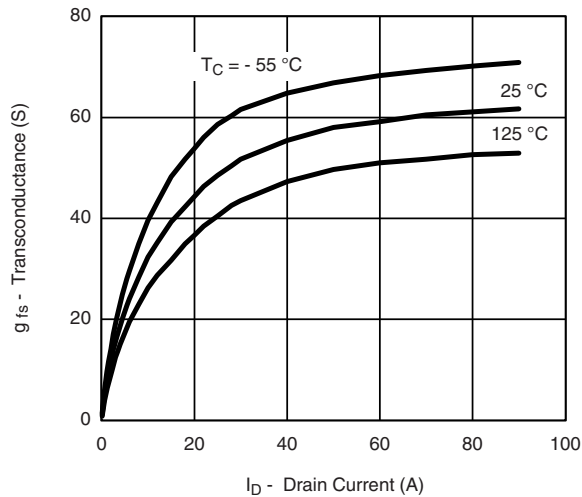
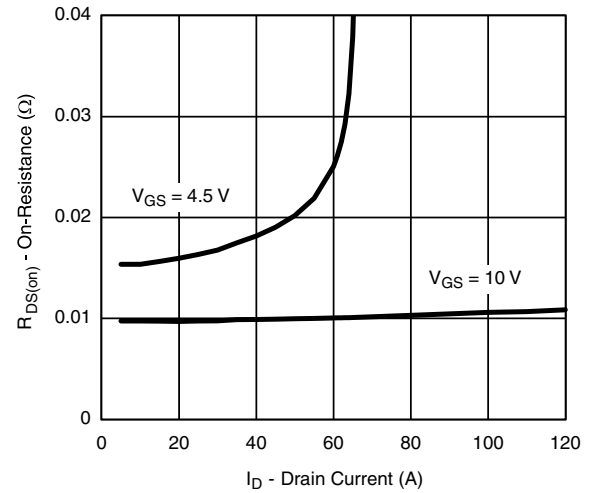
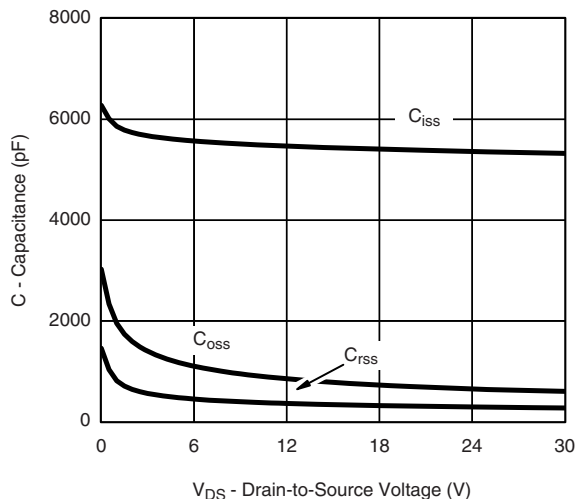
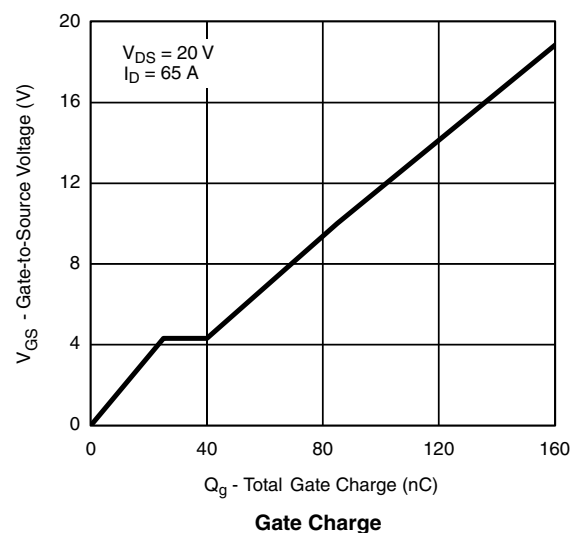
c. See SOA curve for voltage derating.

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	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 = 175 °C			- 250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = - 5 V, V _{GS} = - 10 V	- 120			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A		0.012	0.015	Ω
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 125 °C			0.024	
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 175 °C			0.030	
		V _{GS} = - 4.5 V, I _D = - 20 A		0.018	0.023	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 50 A	20			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 25 V, f = 1 MHz		5400		pF
Output Capacitance	C _{oss}			640		
Reverse Transfer Capacitance	C _{rss}			300		
Total Gate Charge ^c	Q _g	V _{DS} = - 20 V, V _{GS} = - 10 V, I _D = - 65 A		85	130	nC
Gate-Source Charge ^c	Q _{gs}			25		
Gate-Drain Charge ^c	Q _{gd}			15		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 20 V, R _L = 0.3 Ω I _D ≅ - 65 A, V _{GEN} = - 10 V, R _G = 2.5 Ω		15	25	ns
Rise Time ^c	t _r			380	580	
Turn-Off Delay Time ^c	t _{d(off)}			75	115	
Fall Time ^c	t _f			140	210	
Source-Drain Diode Ratings and Characteristics (T _C = 25 °C) ^b						
Continuous Current	I _S				- 65	A
Pulsed Current	I _{SM}				- 240	
Forward Voltage ^a	V _{SD}	I _F = - 65 A, V _{GS} = 0 V		- 1.2	- 1.5	V
Reverse Recovery Time	t _{rr}	I _F = - 65 A, dI/dt = 100 A/μs		40	80	ns
Peak Reverse Recovery Charge	I _{RM(REC)}			2	4	A
Reverse Recovery Charge	Q _{rr}			0.04	0.1	μC

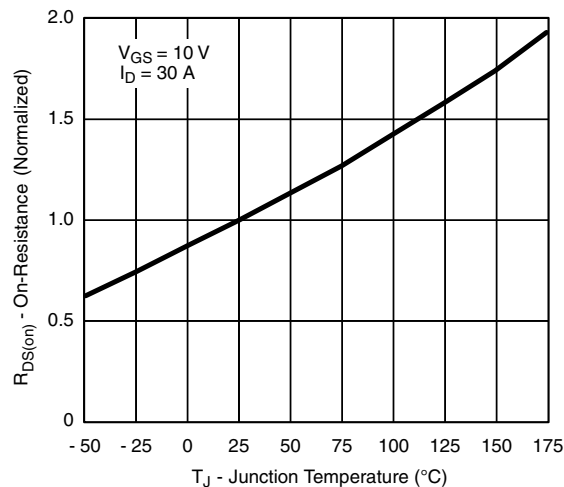
Notes:

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

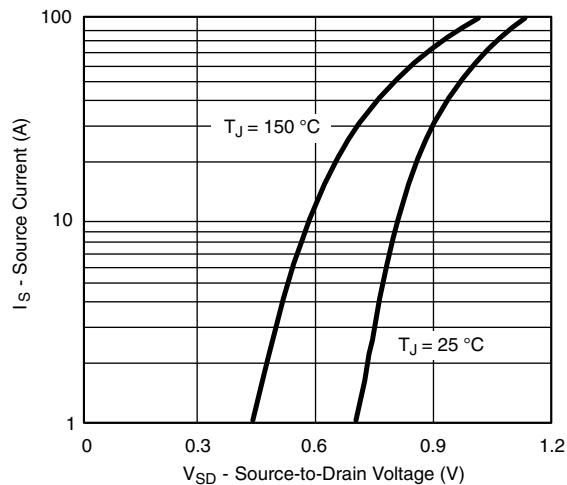
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

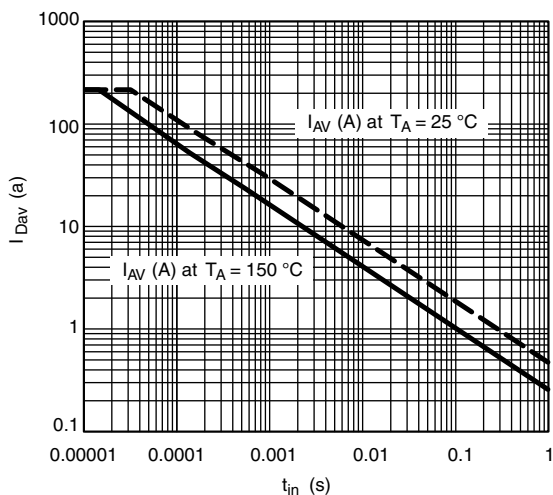
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



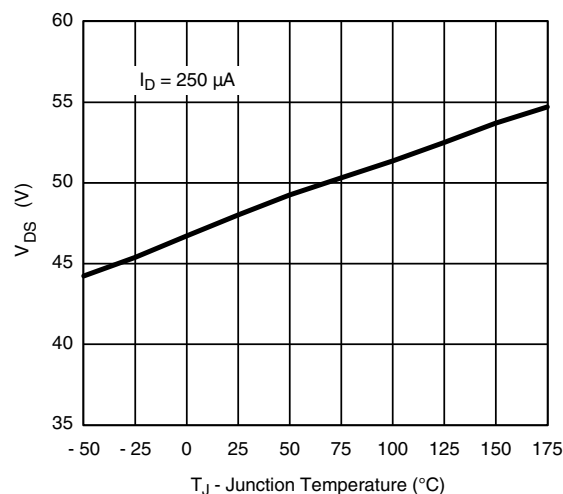
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

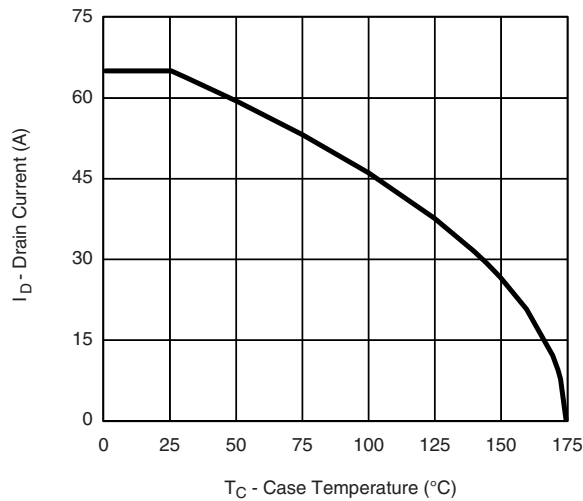


Avalanche Current vs. Time

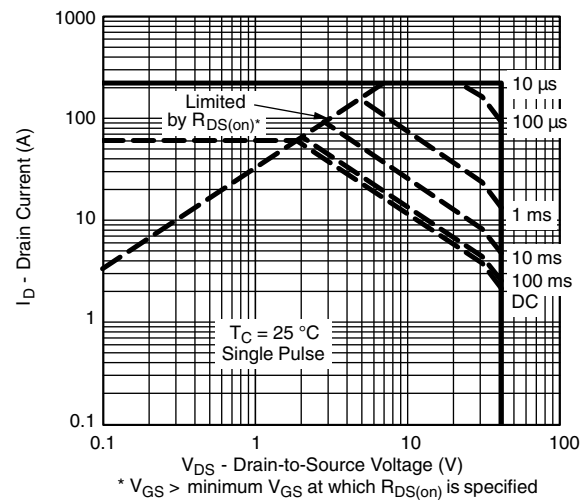


Drain Source Breakdown vs. Junction Temperature

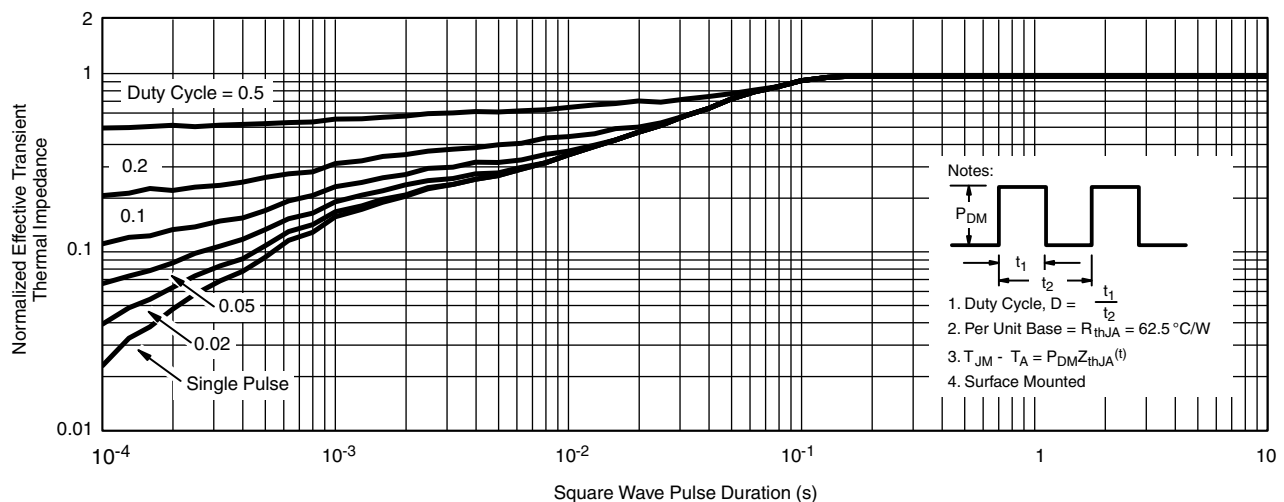
THERMAL RATINGS



Maximum Avalanche and Drain Current
vs. Case Temperature



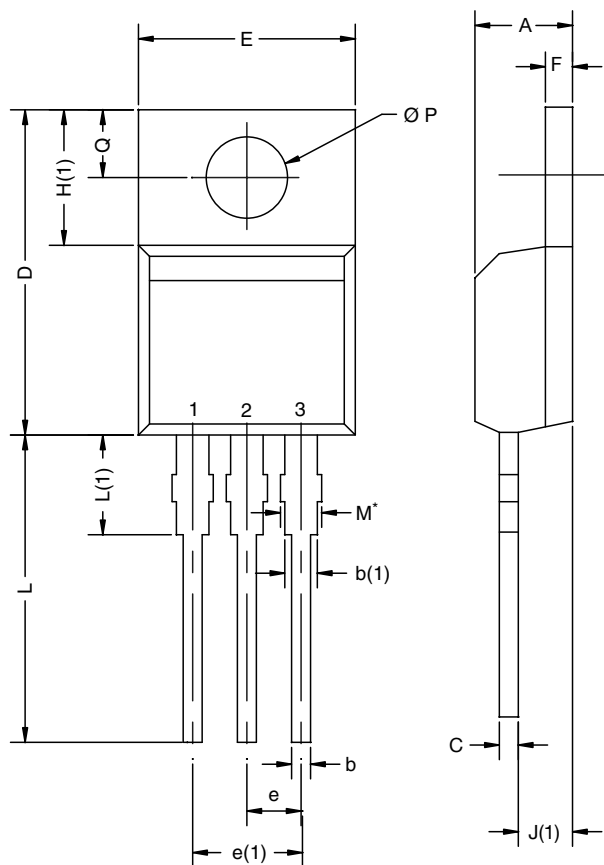
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T13-0724-Rev. O, 14-Oct-13
DWG: 5471

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM



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