

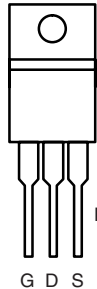
## N-Channel 30-V (D-S), 175 °C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
30	0.004	75 <sup>a</sup>

**FEATURES**

- TrenchFET<sup>®</sup> Power MOSFETs
- 175 °C Rated Maximum Junction Temperature

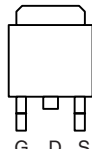

 Available  
**RoHS\***  
 COMPLIANT

**TO-220AB**


DRAIN connected to TAB

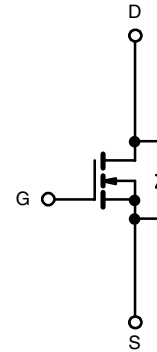
G D S

 Top View  
 SUP75N03-04

**TO-263**


DRAIN connected to TAB

G D S

 Top View  
 SUB75N03-04


N-Channel MOSFET

**Ordering Information:** SUP75N03-04  
 SUP75N03-04-E3 (Lead (Pb)-free)  
 SUB75N03-04  
 SUB75N03-04-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted				
Parameter		Symbol	Limit	Unit
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_J = 175\text{ }^\circ\text{C}$ )	$T_C = 25\text{ }^\circ\text{C}$	$I_D$	75 <sup>a</sup>	A
	$T_C = 125\text{ }^\circ\text{C}$		75 <sup>a</sup>	
Pulsed Drain Current		$I_{DM}$	250	
Pulse Diode Forward Current		$I_{SM}$	250	
Continuous Source Current (Diode Conduction)		$I_S$	75	
Avalanche Current		$I_{AR}$	75	
Avalanche Energy	$L = 0.1\text{ mH}$	$E_{AS}$	280	mJ
Repetitive Avalanche Energy <sup>b</sup>	$L = 0.05\text{ mH}$	$E_{AR}$	140	
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$ (TO-220AB and TO-263)	$P_D$	187 <sup>c</sup>	W
	$T_A = 25\text{ }^\circ\text{C}$ (TO-263) <sup>d</sup>		3.7	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to 175	$^\circ\text{C}$
Lead Temperature ( $1/16$ " from case for 10 sec.)	TO-220AB	$T_L$	300	

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount (TO-263) <sup>d</sup>	$R_{thJA}$	40	$^\circ\text{C/W}$
	Free Air (TO-220AB)		62.5	
Junction-to-Case		$R_{thJC}$	0.6	

Notes:

a. Package limited.

 b. Duty cycle  $\leq 1\%$ .

c. See SOA curve for voltage derating.

d. When Mounted on 1" square PCB (FR-4 material).

 For SPICE model information via the Worldwide Web: <http://www.vishay.com/www/product/spice.htm>.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

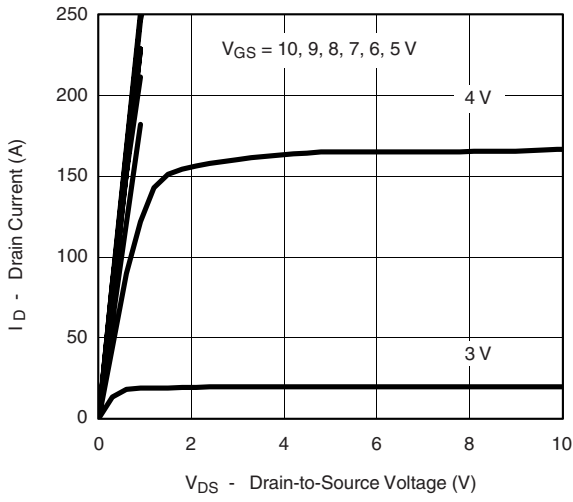
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ <sup>a</sup>	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 500$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			200	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 75\text{ A}$		0.0034	0.004	$\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 75\text{ A}$		0.005	0.006	
		$V_{GS} = 10\text{ V}, I_D = 25\text{ A}, T_J = 125\text{ }^\circ\text{C}$			0.006	
		$V_{GS} = 10\text{ V}, I_D = 25\text{ A}, T_J = 175\text{ }^\circ\text{C}$			0.008	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 25\text{ A}$	30			S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		10742		$\mu\text{F}$
Output Capacitance	$C_{oss}$			1811		
Reverse Transfer Capacitance	$C_{rss}$			775		
Total Gate Charge	$Q_g$	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 75\text{ A}$		200	250	nC
Gate-Source Charge	$Q_{gs}$			40		
Gate-Drain Charge	$Q_{gd}$			40		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_G = 2.5\text{ }\Omega$		20	40	ns
Rise Time	$t_r$			40		
Turn-Off Delay Time	$t_{d(off)}$			190		
Fall Time	$t_f$			95		
<b>Source-Drain Diode Ratings and Characteristics</b>						
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 75\text{ A}, V_{GS} = 0\text{ V}$			1.3	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		70	120	ns
Peak Reverse Recovery Current	$I_{RM(rec)}$			2.8	6	A
Reverse Recovery Charge	$Q_{rr}$			0.1	0.36	$\mu\text{C}$

Notes:

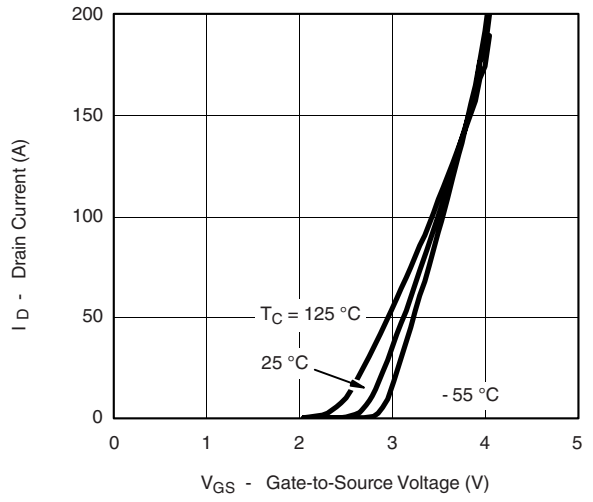
- a. For design aid only; not subject to production testing.
- b. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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.

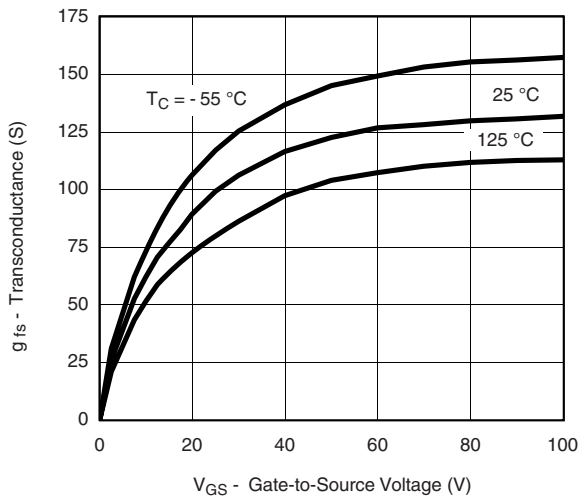
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



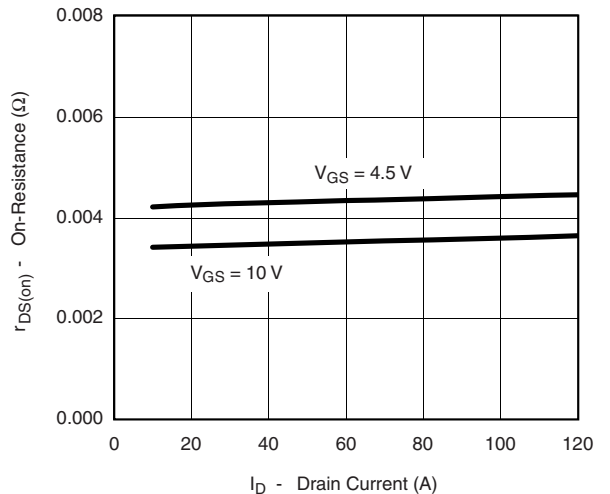
**Output Characteristics**



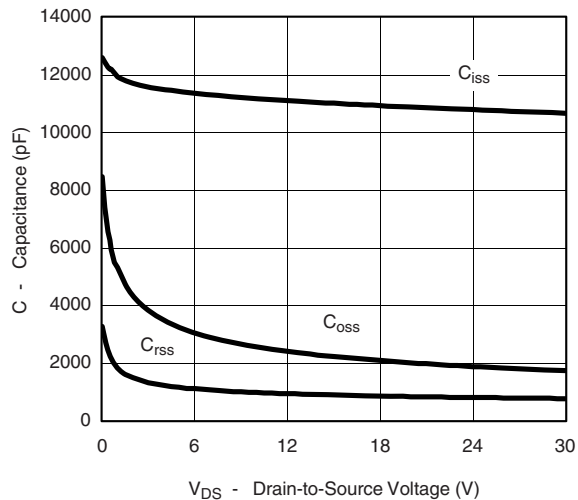
**Transfer Characteristics**



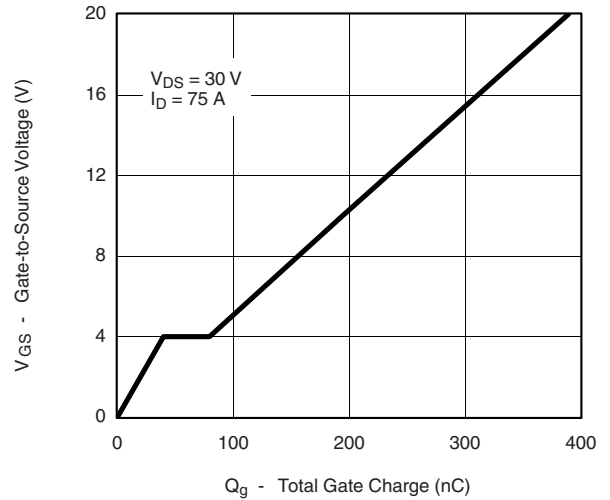
**Transconductance**



**On-Resistance vs. Drain Current**

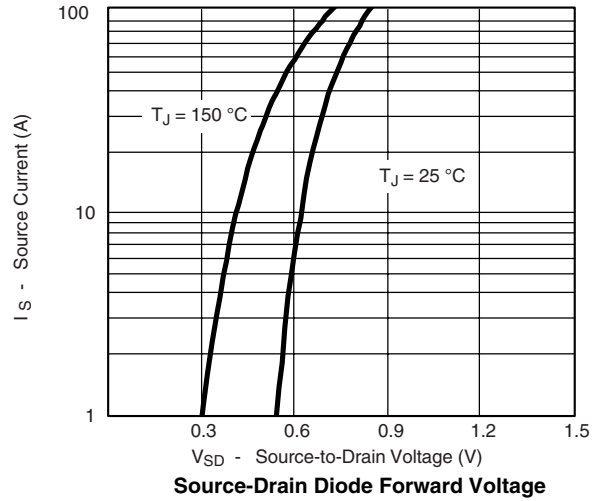
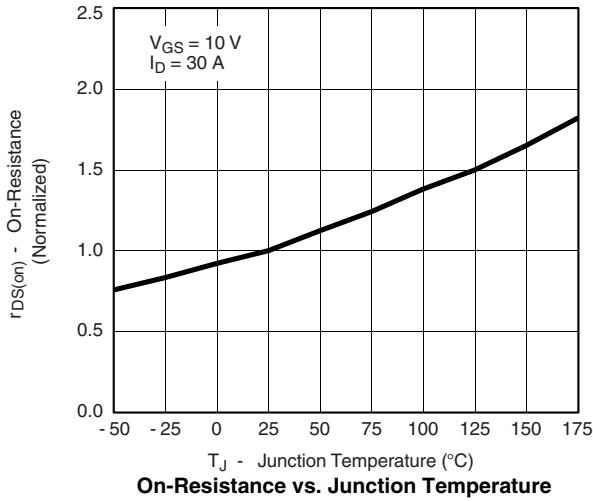


**Capacitance**

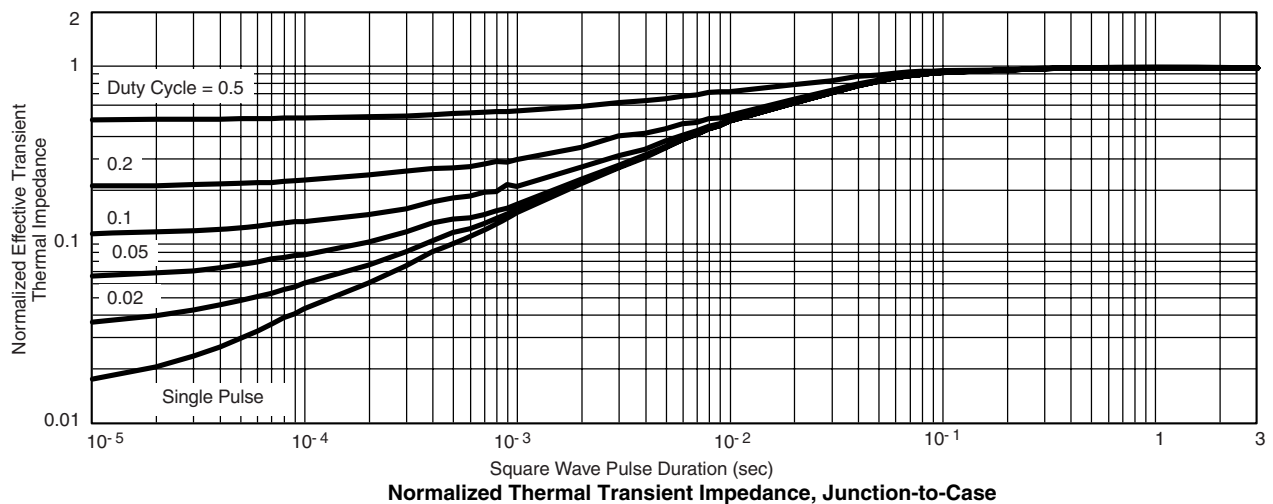
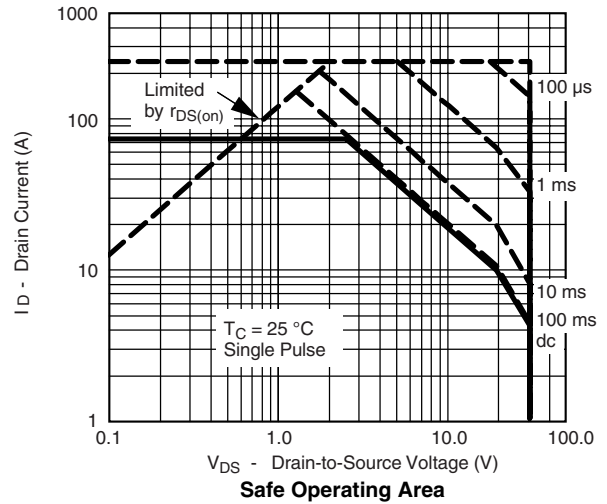
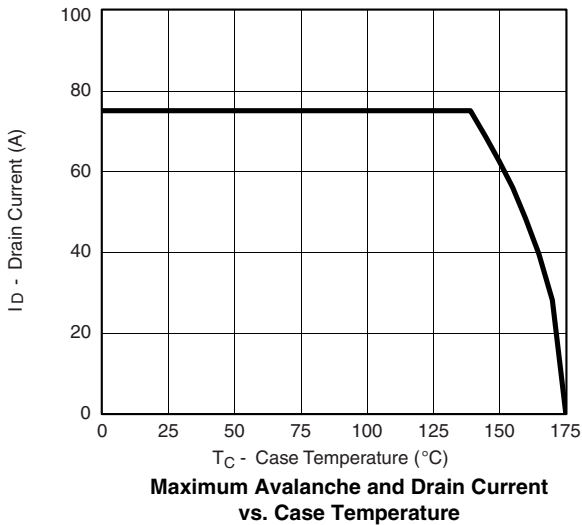


**Gate Charge**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**THERMAL RATINGS**



Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?70745>.



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