

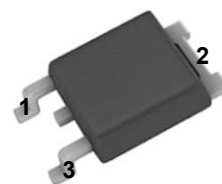
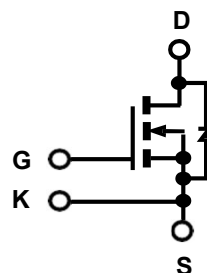
ICE166M75D Silicon Carbide Power MOSFET

Features

- 750V 166mohm SiC MOSFET
- High blocking voltage with low on resistance
- High-speed switching with low capacitances
- Fast Reverse Recovery and Low Qrr
- Simple to Drive and Easy to Parallel
- Avalanche Ruggedness
- Optimized design for high performance power systems



Product Summary			
I_D	$T_A=25^{\circ}\text{C}$	11.6A	Max
$V_{(BR)DSS}$	$T_C=25^{\circ}\text{C}$	750V	Min
$r_{DS(on)}$	$V_{GS}=18\text{V}$	166m Ω	Typ
Q_g	$V_{DS}=500\text{V}$	11.4nC	Typ



T0252

Standard Metal Heatsink

1=Gate, 2=Drain, 3=Source.

Maximum ratings^a, at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_c=25^{\circ}\text{C}$	11.6	A
		$T_c=100^{\circ}\text{C}$	7.3	
Pulsed drain current	$I_{D, \text{pulse}}$		44	A
Maximum gate source voltage	$V_{GS(max)}$		-10/+22	V
Operational gate source voltage	$V_{GS \text{ op}}$		-5/+15, 18	V
Power dissipation	P_{tot}	$T_c=25^{\circ}\text{C}$	34.9	W
		$T_c=100^{\circ}\text{C}$	13.9	
Storage temperature	T_{stg}		-55 to +150	$^{\circ}\text{C}$
Operating temperature	T_j			

^a Pulse width limited by T_{jmax}

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case	R_{thJC}		-	-	3.58	°C/W
Soldering temperature, wave soldering only allowed at leads	T_{solder}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics^a, at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V$	750	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=2mA$, $T_j=25^{\circ}\text{C}$	2	2.9	4	
		$V_{DS}=V_{GS}$, $I_D=2mA$, $T_j=150^{\circ}\text{C}$	-	2.1	-	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=750V$, $V_{GS}=0V$, $T_j=25^{\circ}\text{C}$	-	0.1	50	μA
		$V_{DS}=750V$, $V_{GS}=0V$, $T_j=150^{\circ}\text{C}$	-	1	-	
Gate source leakage current	I_{GSS}	$V_{GS}=-10/+22V$, $V_{DS}=0V$	-	-	± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=18V$, $I_D=8A$, $T_j=25^{\circ}\text{C}$	-	166	216	m Ω
		$V_{GS}=18V$, $I_D=8A$, $T_j=150^{\circ}\text{C}$	-	200	-	
Gate resistance	R_G	$f=1\text{ MHz}$, $V_{AC}=30mV$	-	10.1	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	$V_{DS}=500V$, $V_{GS}=0V$, $f=100\text{ kHz}$, $V_{AC}=30mV$	-	274	-	pF
Output capacitance	C_{oss}		-	25	-	
Reverse transfer capacitance	C_{rss}		-	3	-	
C_{OSS} stored energy	E_{oss}		-	4	-	μJ
Forward transconductance	g_{FS}	$V_{DS}=20V$, $I_D=8A$	-	3.1	-	S
Turn-on delay time	$t_{d(on)}$	$V_{DS}=500V$, $V_{GS}=0/+15V$, $I_D=8A$, $R_G=6.6\Omega$ (External), $T_j=25^{\circ}\text{C}$	-	11	-	ns
Rise time	t_r		-	16	-	
Turn-off delay time	$t_{d(off)}$		-	11	-	
Fall time	t_f		-	20	-	
Turn-on switching energy	E_{ON}		-	67.3	-	μJ
Turn-off switching energy	E_{OFF}		-	19.6	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Dynamic characteristics

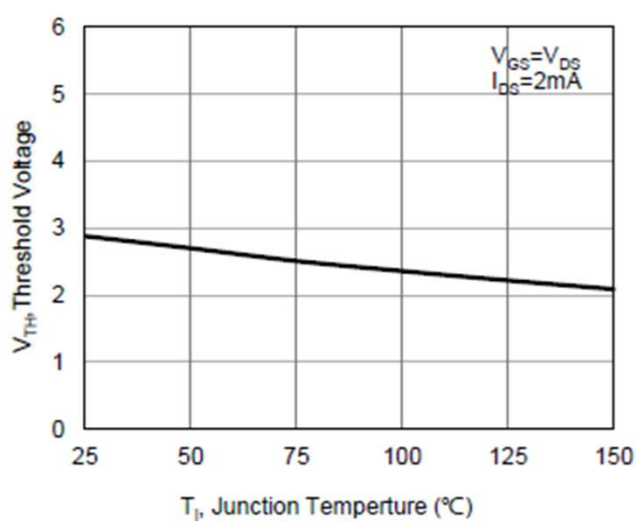
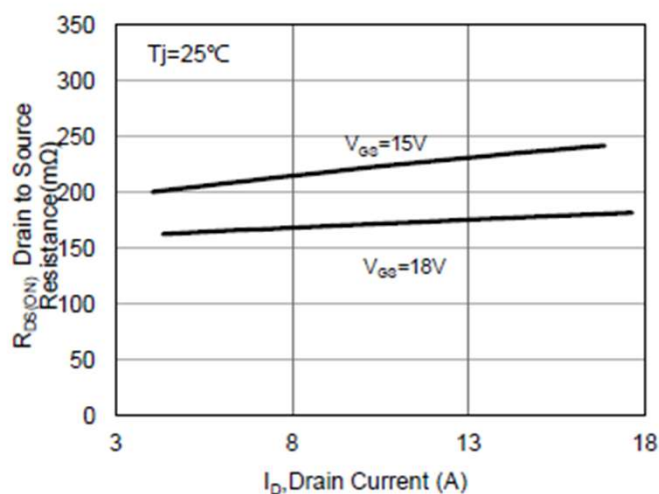
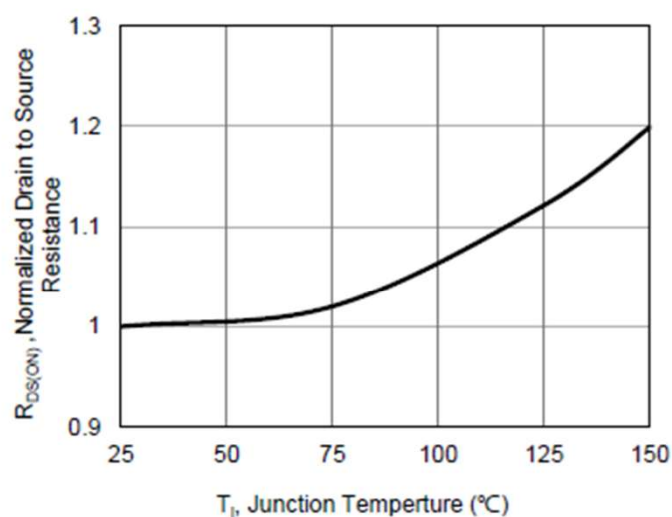
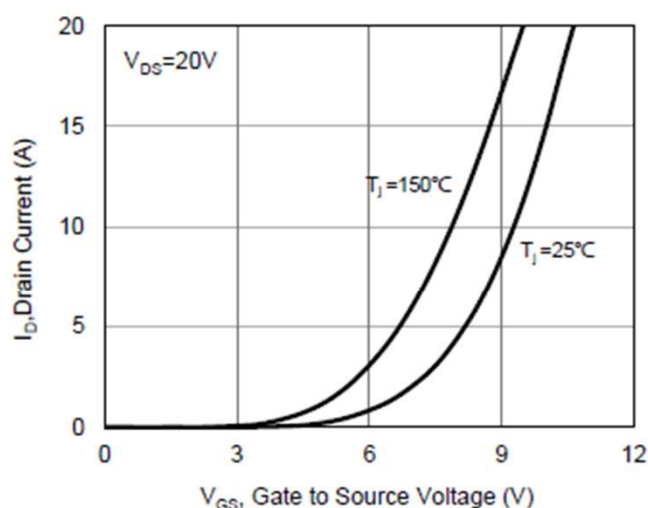
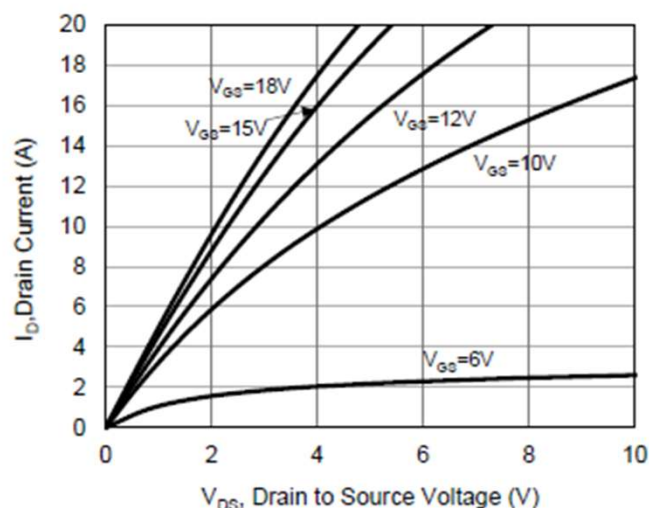
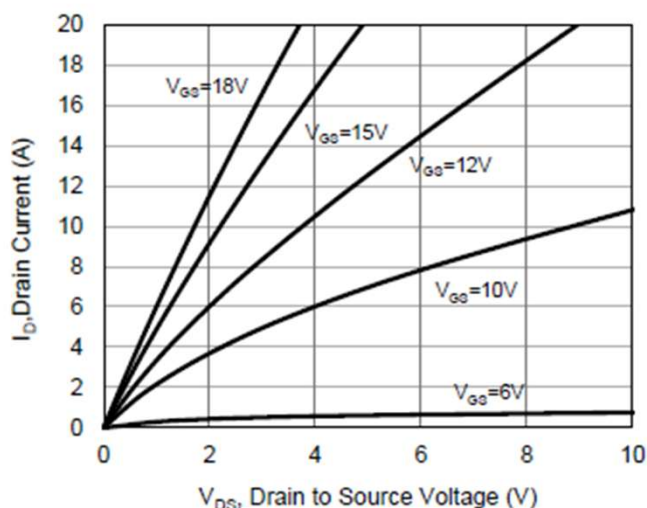
Turn-on delay time	$t_{d(on)}$	$V_{DS}=500V, V_{GS}=0/+15V,$ $I_D=8A, R_G=6.6\Omega$ (External), $T_j=150^\circ C$	-	10	-	ns
Rise time	t_r		-	17	-	
Turn-off delay time	$t_{d(off)}$		-	14	-	
Fall time	t_f		-	22	-	
Turn-on switching energy	E_{ON}		-	78.4	-	μJ
Turn-off switching energy	E_{OFF}		-	10.8	-	

Gate Charge Characteristics

Gate to source charge	Q_{gs}	$V_{DS}=500V, I_D=8A,$ $V_{GS}=0$ to $+15V$	-	3.3	-	nC
Gate to drain charge	Q_{gd}		-	2.7	-	
Gate charge total	Q_g		-	11.4	-	

Reverse Diode

Continuous forward current	I_S	$V_{GS}=0V$	-	-	11.6	A
Diode forward voltage	V_{SD}	$V_{GS}=0V, I_{SD}=4A, T_j=25^\circ C$	-	2.7	-	V
		$V_{GS}=0V, I_{SD}=4A, T_j=150^\circ C$	-	2.5	-	
Reverse recovery time	t_{rr}	$V_{GS}=0V, V_{RR}=500V,$ $I_{SD}=8A,$ $d_{iF}/d_t=777 A/\mu s, T_j=25^\circ C$	-	26	-	ns
Reverse recovery charge	Q_{rr}		-	89	-	nC
Peak reverse recovery current	I_{rm}		-	5	-	A
Reverse recovery time	t_{rr}	$V_{GS}=0V, V_{RR}=500V,$ $I_{SD}=8A,$ $d_{iF}/d_t=1070 A/\mu s, T_j=150^\circ C$	-	29	-	ns
Reverse recovery charge	Q_{rr}		-	130	-	nC
Peak reverse recovery current	I_{rm}		-	6.5	-	A



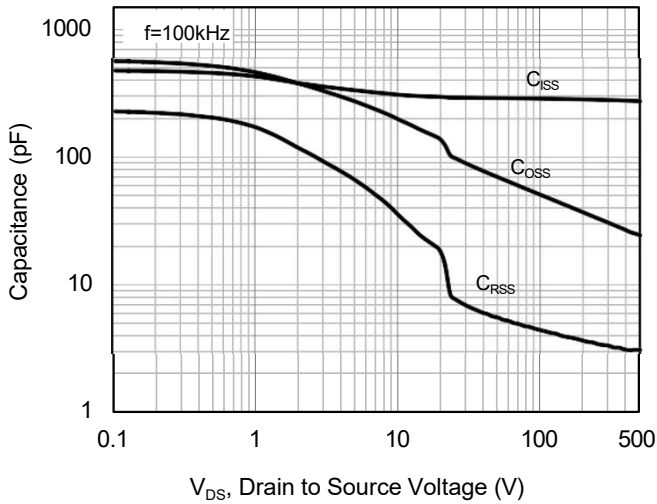


Fig 7. Capacitance Characteristics

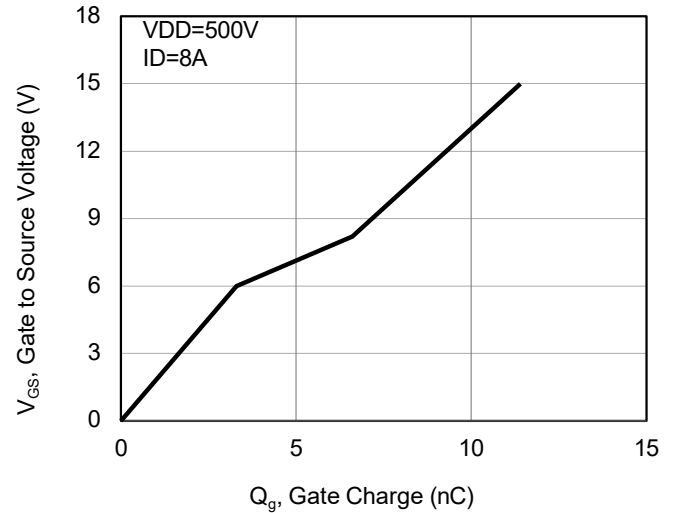


Fig 8. Gate Charge Characteristics

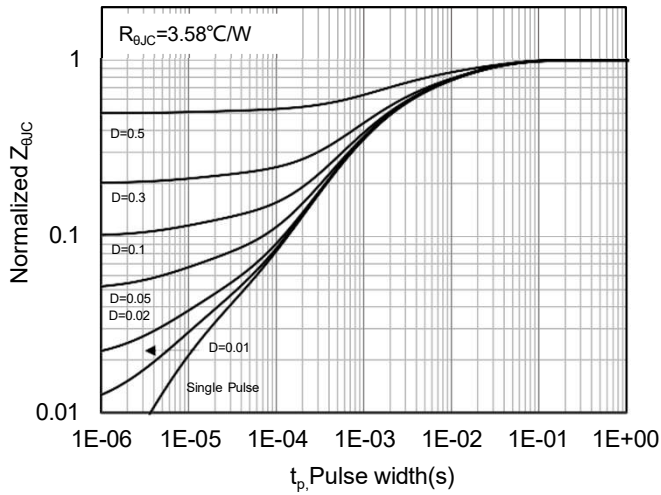


Fig 9. Transient Thermal

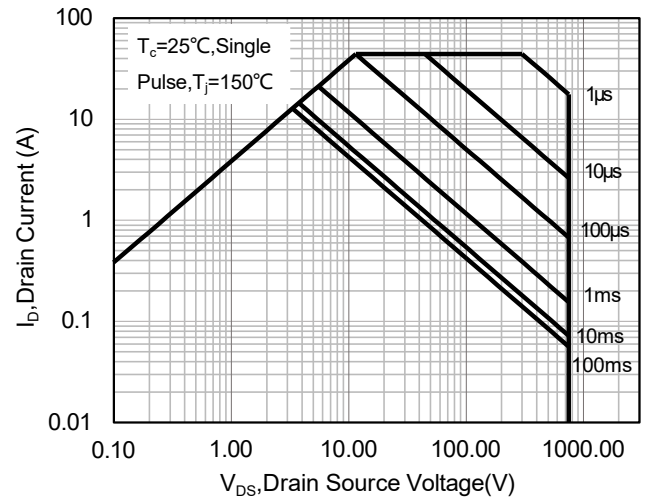


Fig 10. Safe Operating Area

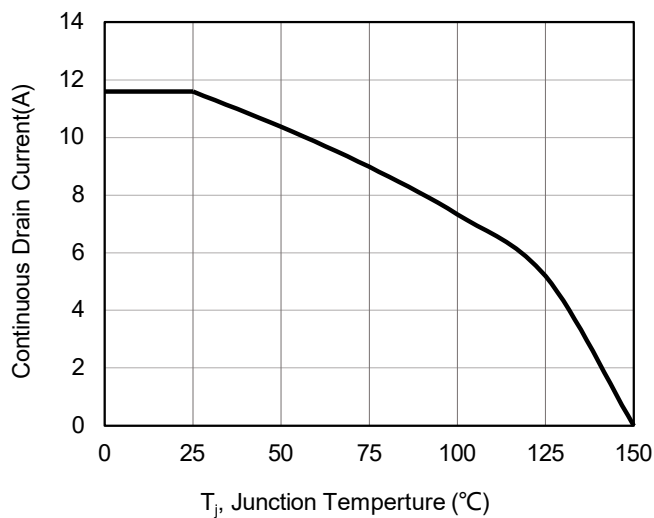


Fig 11. Continuous Drain Current Derating Vs. Case Temperature

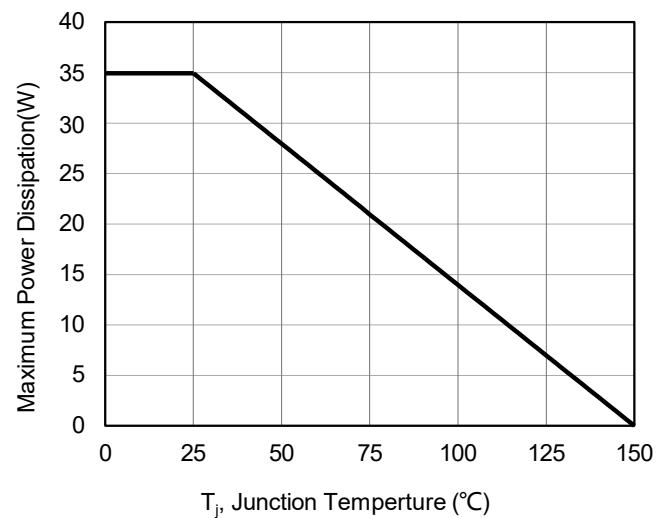


Fig 12. Maximum Power Dissipation Derating vs. Case Temperature

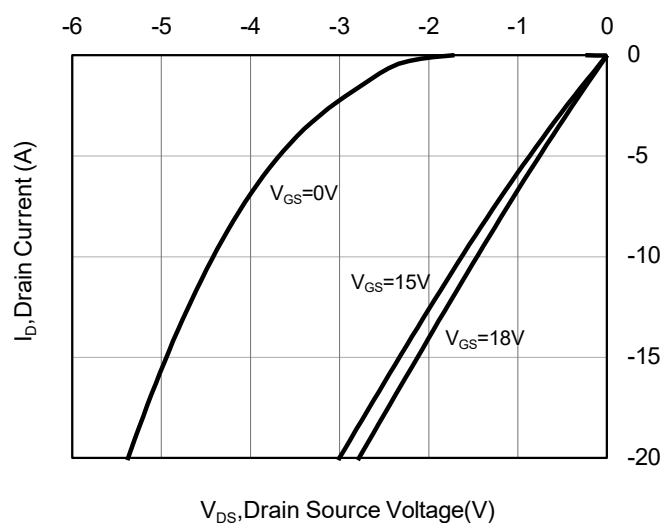


Fig 13. 3rd Quadrant Characteristic at 25 °C

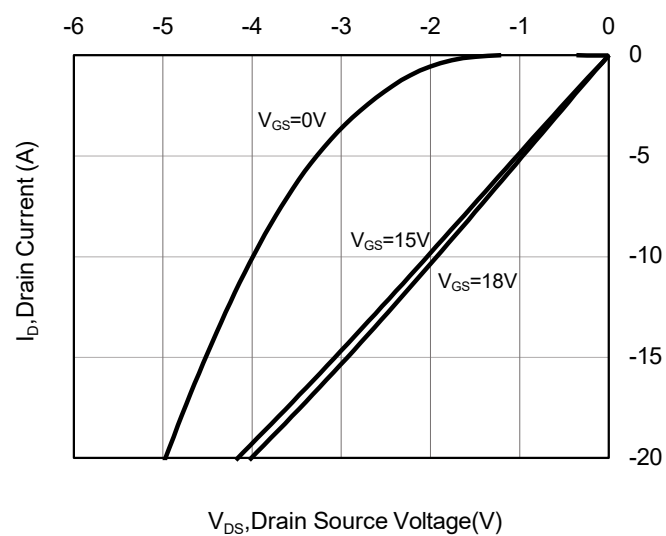


Fig 14. 3rd Quadrant Characteristic at 150 °C

Marking Information

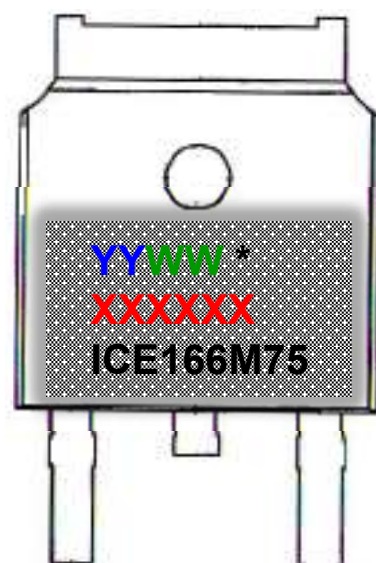
YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXXX = Lot ID

ICE166M75 = ICE is IceMOS logo and
166M75 is a designated device part
number



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