

## N-CHANNEL ENHANCEMENT TYPE MOS-FET

## F-V SERIES

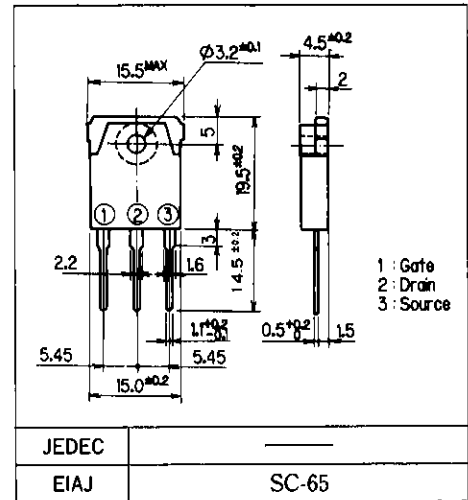
### Features

- Include fast recovery diode
- High voltage
- Low driving power

### Applications

- Motor controllers
- Inverters
- Choppers

### Outline Drawings

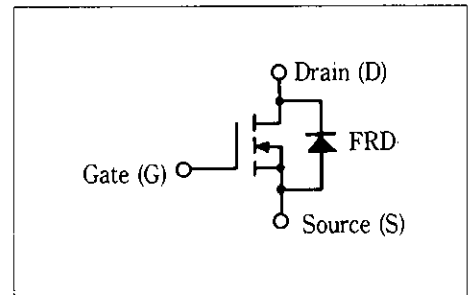


### Max. Ratings and Characteristics

#### Absolute Maximum Ratings (Tc=25°C)

Items	Symbols	Ratings	Units
Drain-source voltage	$V_{DS}$	250	V
Continuous drain current	$I_D$	30	A
Pulsed drain current	$I_{D( Puls)}$	120	A
Continuous reverse drain current	$I_{DR}$	30	A
Gate-source peak voltage	$V_{GS}$	±20	V
Max. power dissipation	$P_D$	150	W
Operating and storage temperature range	$T_{ch}$	150	°C
	$T_{stg}$	-55 ~ +150	°C

### Equivalent Circuit Schematic



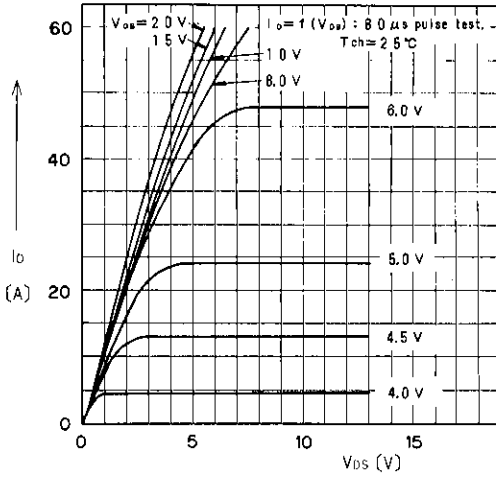
#### Electrical Characteristics (Tc=25°C)

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Drain-source breakdown voltage	$V_{(BR)DS}$	$I_D = 1mA, V_{GS} = 0V$	250			V
Gate threshold voltage	$V_{GS(th)}$	$I_D = 10mA, V_{DS} = V_{GS}$	2.1	3.0	4.0	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 250V, V_{GS} = 0V, T_{ch} = 25°C$		10	500	μA
Gate-source leakage current	$I_{GSS}$	$V_{GS} = ±20V, V_{DS} = 0V$		10	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D = 15A, V_{GS} = 10V$		0.09	0.12	Ω
Forward transconductance	$g_{fs}$	$I_D = 15A, V_{DS} = 25V$	10	20		S
Input capacitance	$C_{iss}$	$V_{DS} = 25V$		2400	3600	pF
Output capacitance	$C_{oss}$	$V_{GS} = 0V$		500	750	
Reverse transfer capacitance	$C_{rss}$	$f = 1MHz$		280	420	
Turn-on time $t_{on}$ ( $t_{on} = t_{d(on)} + t_r$ )	$t_{d(on)}$	$V_{CC} = 150V, R_G = 25Ω, I_D = 30A, V_{GS} = 10V$		35	50	ns
	$t_r$			140	210	
Turn-off time $t_{off}$ ( $t_{off} = t_{d(off)} + t_f$ )	$t_{d(off)}$			420	630	
	$t_f$			180	270	
Diode forward on-voltage	$V_{SD}$	$I_F = I_{DR}, V_{GS} = 0V, T_{ch} = 25°C$		0.90	1.8	V
Reverse recovery time	$t_{rr}$	$I_F = I_{DR}, di/dt = 100A/μs, T_{ch} = 25°C$		100	150	ns

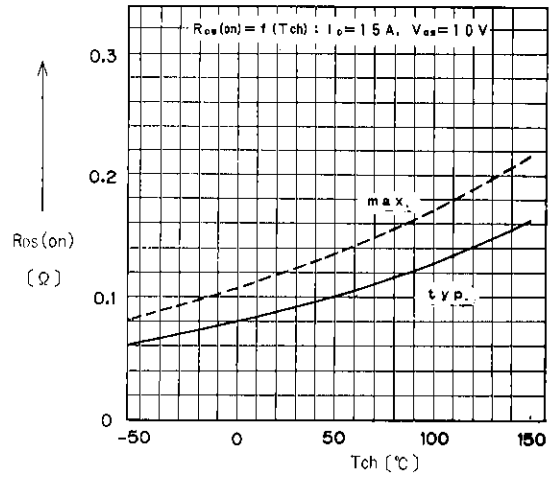
#### Thermal Characteristics

Items	Symbols	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance	$R_{th(ch-a)}$	channel to air			35.0	°C/W
	$R_{th(ch-c)}$	channel to case			0.83	°C/W

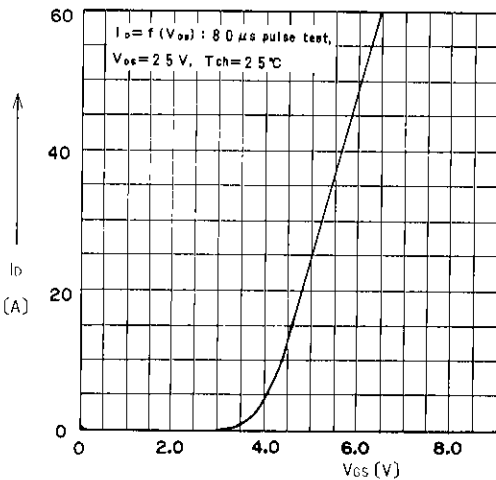
■ Characteristics



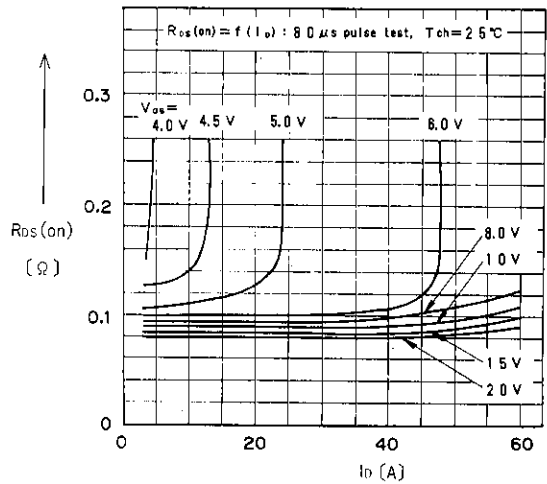
Typical Output Characteristics



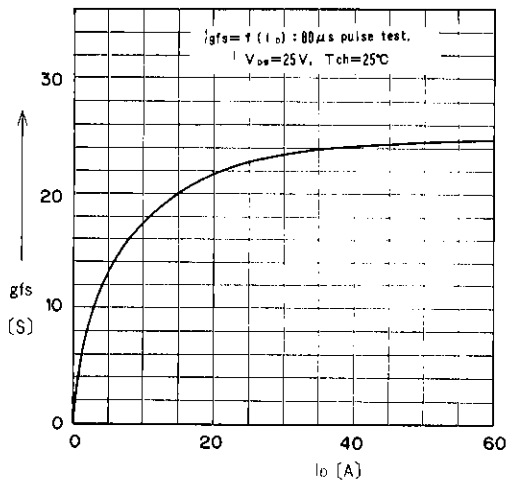
Drain-Source on State Resistance vs. Tch



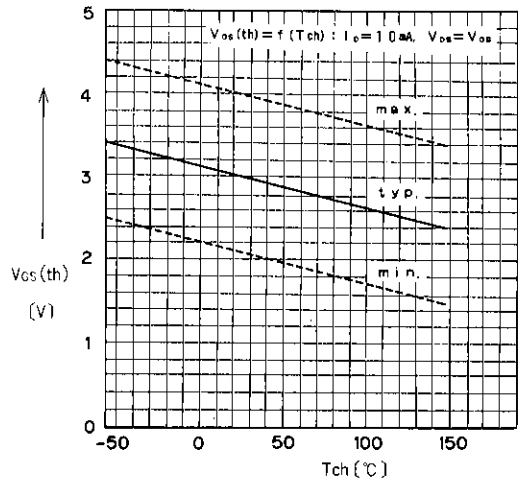
Typical Transfer Characteristic



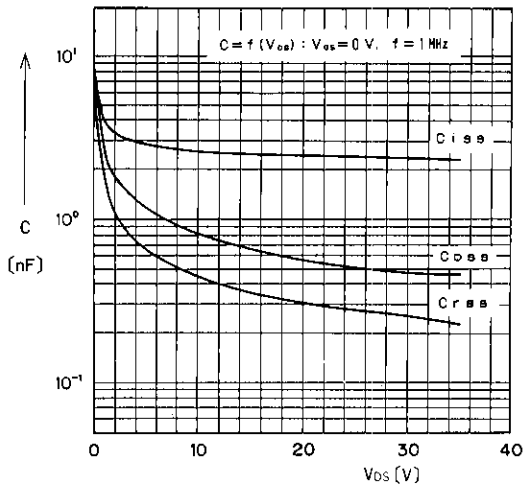
Typical Drain Source on State Resistance vs.  $I_D$



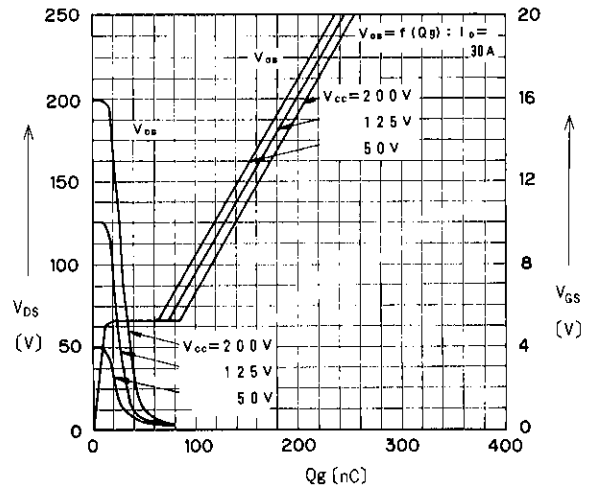
Typical Forward Transconductance vs.  $I_D$



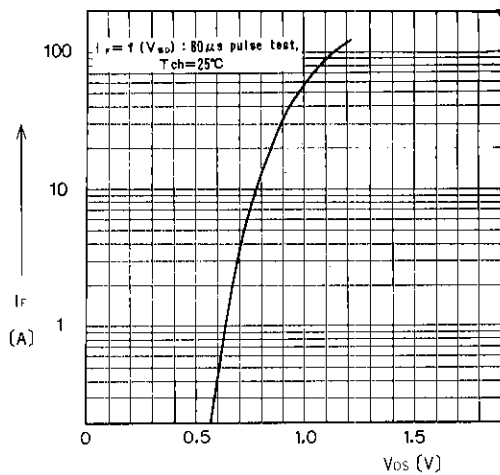
Gate Threshold Voltage vs. Tch



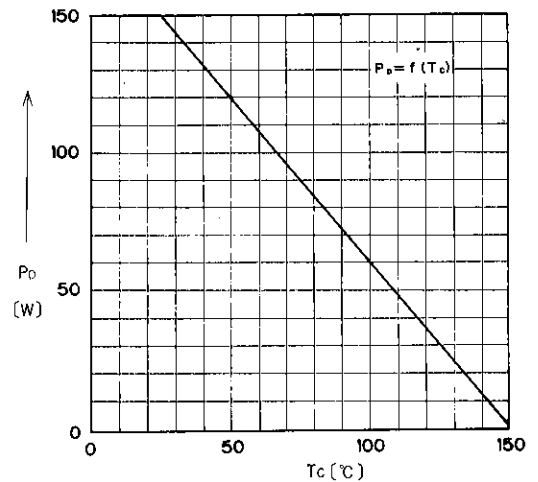
Typical Capacitance vs. V<sub>DS</sub>



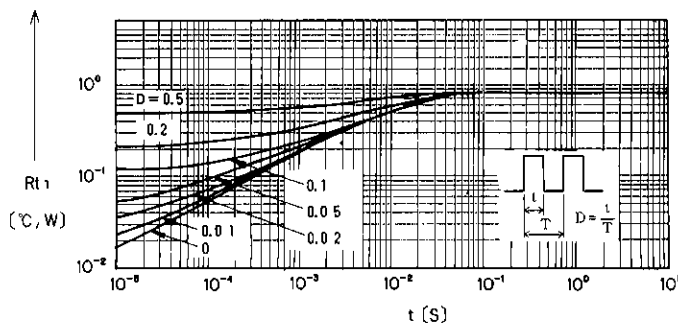
Dynamic Input Characteristics



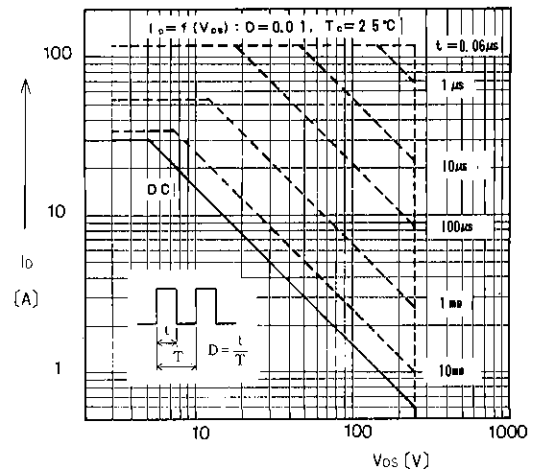
Forward Characteristics of Reverse Diode



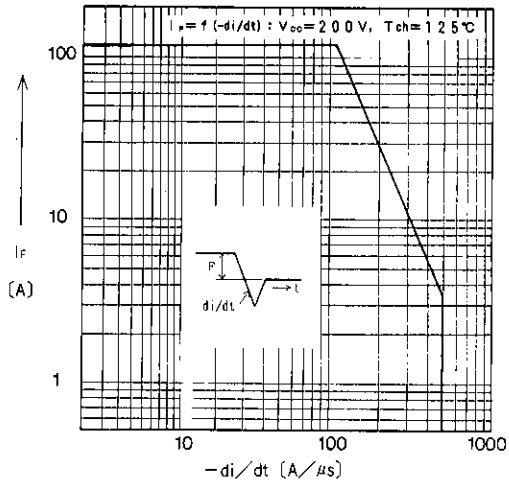
Power vs. Temperature Derating



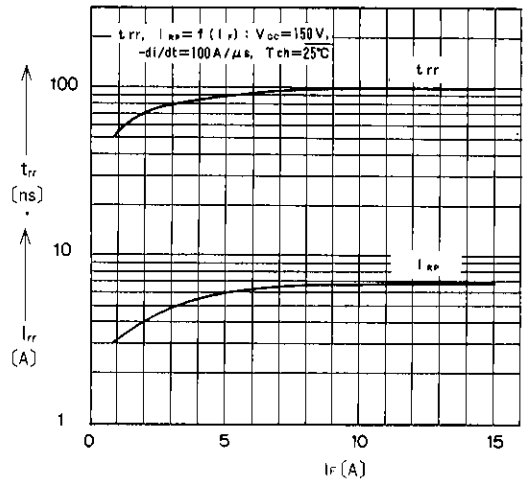
Transient Thermal Impedance



Safe Operating Area



IF-di/dt Characteristics of Reverse Diode



Reverse Recovery Characteristics